The Hungarian Technology Foresight Programme

REPORT BY THE STEERING GROUP

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In 1998 the National Committee for Technological Development (OMFB) launched a technology foresight programme named TEP after its Hungarian acronym. The main objective of the programme was to make a contribution to improving the long-term competitiveness of the country's economy. This would enable new opportunities to be identified in the development of both the market and technology that would improve the quality of life of the population. By analysing the major changes in the economy and society as well as new achievements in science and technology, TEP identifies the key issues and the areas where strategic decisions need to be made that will be crucial for the country's development in the next 15-25 years.

The Steering Group and the thematic panels have assessed the current situation, outlined different scenarios for the future, and formulated their recommendations to implement the favoured approach.

The thematic panels analysed the key aspects of the following, closely interrelated areas:

- Human resources (education and employment)
- Health and life sciences
- Information technology, telecommunications and the media
- The protection and development of the natural and built environment
- Manufacturing and business processes
- Agribusiness and the food industry
- Transport

The TEP reports, analyses and findings of the Delphi survey may be accessed electronically via the home page of the Hungarian Ministry of Education at the following website address: http://www.om.hu.

MINISTRY OF EDUCATION OF THE REPUBLIC OF HUNGARY

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Preface

TEP, the Hungarian Technology Foresight Programme, was launched in 1997 further to a decision by the Council of the National Committee for Technological Development (now called the National Committee for Technological Development- OMFB).

The profound changes that have occurred in the world over the past few decades have resulted in increased importance being accorded to knowledge, science, technology and innovation in most of the advanced countries of the world. It has become necessary to take a more long-term approach and thus to apply new methodologies and tools for strategic decision-making. Since the start of Hungary's political and economic transition, the government bodies responsible for science and technology policy have paid great attention to the development and experiences in these areas. It has become increasingly clear that technology foresight is of a particular prominence as an instrument of innovation policy.

Hungary experienced very rapid and intensive changes during most of the 1990s, a situation which did not lend itself to either long-term approaches or strategic decision-making. In 1996-97 certain macro-economic factors led us to believe in the feasibility of formulating questions relevant to a long-term vision of the future in respect of technology. These macro-economic factors included the end of the intensive phase of privatisation, a significant drop in unemployment and inflation and a stable economic growth. As soon as TEP was launched it became evident that there would be an increasing need for long-term strategic thinking within society.

The underlying principle of TEP is the existence of more than one possible scenario for the future. The future is not the definite and unalterable consequence of present circumstances and trends but depends, to a great extent, on our present and future decisions. A foresight programme may therefore be able to change a strategic decision-making culture constrained by old habits and identify new issues and opportunities to be discussed and considered by policy-makers.

Firstly, the remit of TEP is not to outline the trends in different fields of technology and/or science for the next 20 years. Even a forecast of 2-3 years constitutes a serious risk in a number of fields such as information technology and telecommunications. The objective of TEP is to identify new opportunities in the market and in technology, to devise adequate responses to these in order to enhance long-term competitiveness and therefore improve the quality of life of the people. In other words it aims to play a part in shaping a strategy for a development that is socially, economically and environmentally sustainable. By analysing socio-economic trends, scientific and technological achievements and their anticipated development, TEP may identify areas where strategic decisions should be made or a specific direction should be chosen which may prove crucial to the future of the country.

Upon launching the programme, OMFB was aware that the application of this new tool would lay the foundation for a dialogue of an entirely new culture between professional communities with different interests. This interaction must be sustained at all costs in order to strengthen the national system of innovation, which is undergoing significant changes under the new circumstances of the market economy. Thousands of experts

were involved in the activities of the seven panels and the Steering Group throughout the duration of the work that took over two years. They participated actively in professional discussions, took part in the Delphi survey and this report would not have been produced without their contribution. Moreover, their work has fundamentally defined the content and quality of the documents and all the experts should be thanked for their active participation and valuable contribution.

It is an indirect acknowledgement of their work and the result of this professional interaction that the findings and recommendations of this collective study may already be found in documents prepared by various professional and governmental organisations. They are also appearing in other publications dealing with the current situation and future opportunities of the Hungarian economy and society.

The final results of TEP are the reports by the Steering Group and the panels, in particular in the policy recommendations outlined in the documents. The Hungarian technology foresight programme has applied several methods that may be considered unique even by international standards. A particular effort has been made not only to analyse the links within given professional fields but also the horizontal relationships between these fields. An example of this are the overlapping influences between information technology, human resources and environmental protection. Macro-visions of the future were also applied for the first time in the history of technology foresight programmes. This new approach deserves international attention, at least from a methodological perspective.

TEP's objective was not to provide information on brand new technologies or to outline futuristic visions. Similarly there was no intention to prepare action programmes at company or government level. In accordance with its governmental remit, OMFB will make recommendations for concrete actions in the field of technological development to the Government via the Minister of Education. At the same time OMFB will request similar actions from its partners in government offices and within scientific and business communities.

I would like to thank the members of TEP's Steering Group, the panels and all the experts taking part in the work for their selfless, enthusiastic and responsible contributions. The results themselves mean that we are also reliant on their participation in the implementation phase. I would like to express my special gratitude to the late President of OMFB, Dr. István Bihari, who not only initiated the Hungarian technology foresight programme, but was also an enthusiastic supporter and active stimulus to the very end.

László Palkovits

Chairman of OMFB

Table of Contents

There is more than one possible future; today's decisions influence the future. Even unfavourable trends may be changed if concerted efforts are made by business people, scientists and engineers together with policy-makers.

Executive summary

Hungary has arrived at a crossroads in its history once again and is entering unknown territory in the 10th year of extensive economic and social changes. The period during which we have been concentrating our intellectual and material resources on the progression of this transformation may have been short in relation to history but major changes took place in the world in this time. We have replaced the one-party system with a multi-party parliamentary democracy and the centrally planned economy with a market economy. We are now faced with the decision of how we wish to react to the challenges of the knowledge-driven, globalised economy and of how we envision our future.

THE METHODOLOGY: SNAPSHOTS, SCENARIOS AND RECOMMENDATIONS

The dilemma regarding the choice of mere survival or catching up has already been successfully addressed by a number of western European countries. Finland, Ireland and Portugal have proved, by implementing an appropriate strategy, that remarkable results can be achieved in 15-20 years. Our basic assumption, which was similar to theirs, was that we have to be prepared for more than one possible future and that we do not have to accept it passively. It is possible in the long term to augment the effects of favourable trends and counter those of unfavourable ones if businesses, researchers and the government sector work together in a coordinated manner.

The main objective of the Hungarian Technology Foresight Programme was to contribute to the formulation of an active, 'catching-up' strategy using new methods and involving several thousands of experts in the exercise. Through applying the large-scale Delphi survey and other scientific methodology and tools, researchers and experts from business and government sectors analysed and evaluated different areas considered to be the most important with regard to the quality of life and economic competitiveness. The Programme concentrated its efforts on eight different areas during the 28 month project: human resources; health and life sciences; information technology, telecommunications and media; the protection and development of the built and natural environment; manufacturing and business processes; agribusiness and the food industry; transport; and energy. Based on analyses of the current situation (snapshots), workshops and the two-round Delphi survey, the thematic panels devised different scenarios and formulated recommendations for the implementation of the most favourable one.

KNOWLEDGE-DRIVEN ECONOMY

The major changes in the world economy occurring in the 1990s have proved that competitiveness and the quality of life are, to an increasing extent, determined by the way we generate, distribute and apply knowledge and information. The age of the knowledge-driven and learning economy has arrived and new products, manufacturing processes and management tools continue to emerge in unprecedented short periods of

time. The possession of up-to-date knowledge in an increasing number of scientific and technological fields is essential in order to remain competitive.

knowledge and cooperation

New areas of knowledge and new skills may only be linked successfully if there is a close cooperation between small and large enterprises, universities and research institutes.

The boundaries between the formerly separate industries and markets are becoming blurred and new competitors are emerging who were previously kept at a distance by strong barriers. This is most apparent in the areas of telecommunications, information technology and the media. An increasing number of countries are liberalising their markets and are also attracting foreign direct investment and privatising state monopolies through deregulation and new incentives. Actual physical distance is losing significance due to the advancement of the technologies concerning information, telecommunication and transport. An increasing number of industries and services are therefore only able to achieve profitability on a global scale. Economic competition is becoming increasingly fierce and is crossing the borders of national markets.

NATION-STATES UNDER PRESSURE TO ACT

National economies that try to isolate themselves from globalisation will be left behind permanently. The same future awaits countries that are unable to offer mutually beneficial strategies to their foreign partners, particularly to multinational corporations, and are not prepared for competition in a new environment. These countries will become dependent on the more visionary and competitive players in the world economy and they will become subordinates in the global division of labour.

Companies are now finding themselves in a totally new environment following the combined and therefore intensified effects of technological development, deregulation, privatisation and globalisation. At the same time, nation-states are also under pressure to act due to the increasingly important role of international institutions, organisations, regional (local) governments and corporations in economic and social decision-making. Governments must acquire sound knowledge of the nature and driving forces of these new phenomena and then set national rules and create new policy frameworks for the knowledge-driven economy. There is no doubt that the ways and means of the new regulatory system will be different from those of the old one.

new challenges and new roles

Globalisation results in the necessity for deregulation on the one hand and re-regulation on the other as the development of information technology, biotechnology and environmental protection brings about new challenges at both global and national levels. In order to pave the way for a knowledge-driven development, we have to introduce new regulations for competition to cultivate an innovative approach in companies and individuals in respect of innovation. Regulations on environmental protection, consumer protection and taxation should also be harmonised on an international level.

CHANGING VALUES

A knowledge-driven development brings about new challenges for organisations and individuals alike. New economic, social and cultural requirements will have to be met by companies, schools, universities, research institutes, professional associations, civic organisations as well as employees, managers, researchers, policy-makers and politicians. The traditional, rigid hierarchies will be replaced by so-called 'flat' organisations, which are flexible and adapt continuously to the ever-changing environment whilst tapping into and exploiting more and more resources through networking. The employees of these organisations will be given increased independence and also responsibility for decision-making.

lifelong learning

Consequently, individuals will need more than the knowledge acquired during their school years and they will have to learn continuously throughout their whole life. The ability to learn, adapt and solve problems will become increasingly important in comparison to encyclopaedic knowledge.

Individuals will often have to work in teams composed of persons of different cultures. In a number of cases the members of such teams will only meet on a virtual basis, for example, through digital networks. Therefore skills relating to the ability to work with other team members and to understand and link knowledge of previously separate and isolated professional fields become essential. This may, however, result in severe stress as many individuals can hardly cope with the constant demands for achievement and adaptability on top of the disappearance of the boundaries between work and leisure time. Adequate solutions to the above problems should be sought at all levels, namely the individual (family), organisational and national level.

CHALLENGES FOR HUNGARY

The above-mentioned changes in values and paradigms are essential to Hungary. The accumulated development deficit of the previous decades described above proved impossible to cure during the 1990s. We are therefore starting from a disadvantageous position and are also dealing with the problems of the social and economic transformation. In spite of this we must prepare to find an advantageous position within a world economic environment that is subject to continuous development and rapid change.

Remarkable results have been achieved in the Hungarian economy and society in the past decade, particularly with regard to improving competitiveness. These achievements were a result of hard work and a high price was paid on some occasions. However, if we take a long-term approach to the factors determining competitiveness, such as the competitiveness of different industries, the quality of human resources, infrastructure or the state of the biosphere, several issues became apparent which cause concern and call for action.

competitiveness and the quality of life

The quality of life of the population is also lagging well behind the competitiveness of the economy which has shown unexpected improvement. This is a dangerous trend,

even from a mere economic perspective, as the key factors of quality of life also have a great effect on the decisions of investors.

stabilisation and selection

The Hungarian economy has already passed the most difficult phase of the transition, the major institutions of a market economy have been established and the confidence of the international business community in the Hungarian economy has strengthened considerably.

The first evolutionary factors may also be seen in the business sector as a result of pressures from foreign trade and the political and institutional changes in the country. The organisations which have survived primarily comprise those which have been able to successfully adopt international management techniques and meet the requirements stipulated by the new owners.

The manufacturing industry is currently in a considerable state of imbalance. On the one hand we have large, foreign companies using high-tech applications, operating at a high level of productivity and focusing primarily on exports. On the other hand there are indigenous, mainly small or medium-sized enterprises which lack capital, have a low potential for growth and are scarcely able to maintain their market share even at local market level.

dual economy

63 of the top 100 exporting companies, accounting for 55.9 per cent of total exports, are majority-owned by foreign shareholders. Only 23 out of these 100 companies conduct R&D activities in Hungary, 14 of which are owned by foreign investors. This means that only 22 per cent of the large, foreign-owned, exporting companies carry out R&D activities in Hungary.

A large number of R&D units were dissolved when the majority of the large domestic companies were restructured and/or privatised and this is a severe disadvantage and a potential danger. In addition, the lack of capital prevents the majority of new start-up enterprises from conducting in-house R&D activities or outsourcing research projects on a contract basis. Resources devoted to R&D have been decreasing continuously during the past decade. Most of the research institutes have been significantly weakened by the decline in company-commissioned research and the drop in public R&D expenditure. In the meantime, however, the scope of Hungarian participation in international research has increased considerably.

underdeveloped innovation system

The Hungarian system of innovation has changed significantly during the past decade. In spite of this, the development of the system as a whole is still driven to a lesser extent by market-pull than by government-push. The already weak innovative networks collapsed and the links between the economy and the primary knowledge-generating institutions (universities and research institutes) diminished. The restructuring process brought about considerable losses but at the same time shaped the elements of a new innovation system which will hopefully be more productive and function more efficiently. The current links between the different elements of the system are still weaker than they should be indicating that the effects of networking are not yet at work.

Only occasional communication takes place within the system and this is on a lower level than desired.

The institutional structure for technology transfer is underdeveloped. However positive changes in this regard were evident in the late 1990s, e.g.: knowledge is becoming a highly appreciated asset by companies. A top priority of economic policy in the next 5-10 years should be to strengthen these fundamentally positive trends and to establish a strong, efficient national system of innovation. The seeds are there to accomplish this.

the need for a new model for agribusiness

Agribusiness has already passed its low point but is not yet on the course towards new development. Efforts and financial resources in this sector are being concentrated on 'putting out the fire' in terms of intervening in order to deal with the frequent and severe market disturbances arising from the current agricultural model. Therefore a new model is inevitable. The overwhelming majority of private farms are very small and family-owned although an increase in the average size of land properties is becoming apparent.

The food industry is lagging behind the level of the previous decade both in respect of output and level of technology. A large number of self-employed persons are active in the food retail and agriculture sectors as entrepreneurs 'of necessity' rather than by choice.

Prussian schools

Most Hungarian schools are based on the Prussian style and may be characterised by a lack of openness and flexibility. They do not prepare their students inadequately for the future in that they do not develop the skills conducive to continuous education or necessary for cooperation, communication and problem solving. They primarily transmit information that is subsequently supposed to be recited.

The former structures, methods and principles have become obsolete and the performance of schools operating in accordance with the old values is in continuous decline, even in comparison with the performance indicators of the previous decade.

In spite of the fact that both the number of students entering secondary schools and those attending higher education institutions increased substantially in the 1990s, we are still lagging behind the developed countries in this regard.

a widening gap

The ratio of GDP spent on education was already lower than the OECD average in 1995. The gap widened as a result of the overall cuts in public spending in the subsequent years and the increase in spending on education did not remain in line with the increase in the country's GDP even after the successful macro-economic consolidation. Per capita expenditure calculated on the basis of real prices decreased considerably, primarily in the areas registering an increase in the number of students (secondary and higher education).

Whereas companies have realised the importance of skills and knowledge to maintain their competitiveness, most teachers and researchers are underpaid to such an extent that people are choosing other careers causing a shortage of human resources in education

and research. One of the consequences of this is a decreasing proportion of young talent choosing teaching or research as a career.

dangers

The above negative trends may widen the development gap. They are also diminishing the country's ability to exploit the potential benefits of the next decade, particularly those provided by biology, biotechnology, and information and telecommunication technology.

The population's health is a cause for concern and is much worse than expected given the level of the country's economic performance. The most serious public health problems are posed by non-infectious chronic illnesses, most of which could be prevented or postponed by well-targeted actions.

population decrease and life expectancy

The country's population has been decreasing on a continuous basis since the 1980s due to a declining birth rate and a high mortality rate. Declining populations are also a general characteristic of developed countries however an alarming number of circulatory illnesses occur amongst the middle-aged male population in Hungary and malignant tumours are also a major problem.

The mortality rate of the middle-aged male population is reminiscent of that of the 1930s. It is therefore not surprising that the average life expectancy at birth for Hungarian males (66.3 years) is nine to ten years below the same indicator in Austria, Japan, Switzerland or Sweden and is five years lower than comparative data in the Czech Republic. The mortality rate of women in the age group of 40-54 is also worse than it was forty years ago and the average life expectancy at birth for Hungarian females (75.1 years) is six to seven years lower than the same indicator in Belgium, Finland, France, Greece, Italy, Austria, Norway, Spain, Switzerland and Sweden. The population decrease in Hungary would be curtailed if we were able to lower the mortality rate to that of the EU average.

environmental damage

The environmental situation of the country also warrants special attention. Half of the population lives in areas with high levels of air pollution. Inadequate sewerage systems and water drainage problems (high ground water levels in large areas) are having a negative effect on the water quality. Biodiversity has also deteriorated and in most residential areas the problem of safe community waste disposal has not yet been resolved.

Negative developments in environmental pollution have led to widespread respiratory problems and malignant tumours and the propensity to allergies in the country is increasing. The low level of environmental awareness is also adding to the problem.

The infrastructures of information technology and telecommunications have improved considerably during the last decade and the providers of both telecommunications services and products have started competing on the market. Nevertheless, these services are still very expensive both on an international scale and in comparison with the income level of the Hungarian population. Consequently this sector is developing

more rapidly in many medium developed countries than in Hungary resulting in an increasing gap between Hungary and, for example, Austria or Spain.

a widening gap

There is a growing digital gap between the various groups of Hungarian society. Almost half of personal computer and Internet users belong to the under 30s age group and, similarly, significant differences are apparent between the number of users in the different sized settlements, with large cities enjoying great advantages.

However, no comprehensive national strategy has yet been established to meet the challenges presented by the information society and to prepare for the changes in the paradigms and values forced on us by the changes in the world economy.

underdeveloped infrastructure and outdated vehicles

The Hungarian transport system is underdeveloped. The country will have to request derogation in the introduction of respective EU regulations in several areas since most of the domestic transport companies are as yet unprepared for international competition. The technical level of the infrastructure and most of the transport vehicle fleet is low.

The implementation of the required maintenance work and overall modernisation efforts may be considerably hampered by the lack of resources and adequate financing tools. Society's ignorance of the environmental damage caused by transport also constitutes a major problem.

THE NEED FOR CHANGE

There is a great need to find adequate solutions to the above problems. We will otherwise only be able to enjoy limited benefits of the knowledge-driven economy and will be unable to join the group of fast developing countries.

Globalisation and integration

Hungary is already an active player in the international division of labour through foreign investment and trade. It has also become a member of major international organisations with either full or associated membership. Nevertheless, the way the country responds to the recent and forthcoming changes is of the utmost importance.

One alternative involves seeking the most promising opportunities, partners and strategies in the light of our current strengths and weaknesses and international trends. In the other case we accept our fate passively and plan on mere survival, enduring the blows that life deals us and drifting with the flow. Experts taking part in TEP were strongly opposed to the latter alternative.

THREE SCENARIOS (MACRO-VISIONS)

Having analysed the trends of the world economy, the socio-economic development of Hungary and assessed the findings of the panels, the TEP Steering Group outlined three scenarios for the future. These may be portrayed in a two by two matrix, with the columns representing Hungary's choice of strategy, either an active, well-designed

strategy or no strategy at all, and the rows depicting any fundamental structural changes in global settings.

	Active strategy	**Drifting (no strategy)**
No major changes in the global settings (with regard to values, norms, and the operation of large corporations and major international organisations)	***Cooperative partnerships*** Hungary implements an active strategy characterised by a high degree of integration and based on mutual benefits and a high level of knowledge-intensity	***Drifting*** Hungary, having no strategy, is forced into the current system of international division of labour along a low-skill and low-wage path
Fundamental, structural changes occur within global settings	***Alternative development*** Hungary is integrated into a new, 'green' world pursuing an active strategy along a knowledge-intensive route	

These three macro visions share one common feature, namely the full integration of Hungary into the future international division of labour as a part of the global and European economic and political systems. We have excluded the case of isolation.

Scenario 1: Co-operative partnerships

This scenario sees Hungary being integrated into the world economy along the path of high knowledge-intensive development. This is achieved by the implementation of an active, mutually beneficial strategy which also respects the importance of the quality of life of the people.

The milestones to be achieved along this route are as follows: a significant increase in support for the generation and utilisation of knowledge, a high level of priority for health and the environment and an improving solidarity and social cohesion. Alongside active government policies and measures, the developing role of civil society plays a crucial part in the implementation of this strategy together with a close cooperation between government institutions, civil organisations and business communities at national, regional and local level.

catching up

The dominant trends in the international economy also become evident in Hungary in the course of its integration. Nevertheless an active strategy and an improved capacity to adapt on the basis of a high degree of knowledge-intensity contribute to alleviating negative impacts and exploiting favourable opportunities. This leads to a significantly improved quality of life and enables Hungary to catch up with the medium-developed countries during the next 15-20 years.

Scenario 2: Drifting

Under this scenario Hungary also integrates into the global economy and joins the European Union. However, due to the absence of an active government strategy, or the presence of one of a significantly lower level, this integration proceeds by reaffirming Hungary's present semi-peripheral position and, even in the best case, it develops along the path of a medium level of knowledge-intensity.

defencelessness

This 'future' leads to an increasing vulnerability in the realm of international politics and the economy which endangers the country's sovereignty and therefore considerably lessens the ability to influence social developments.

This scenario will not allow us to effectively realise the opportunities provided by international cooperation, particularly those offered by the European Union. Moreover the application of more complex indicators than per capita GDP to measure the level of social advancement would reveal an increasingly widening gap on an international level and a significantly deepening social divide internally.

Scenario 3: Alternative development

According to the basic assumption of this scenario, a fundamentally new way of thinking and a new system of values start to prevail in the world. This results in a socially and ecologically sustainable globalisation based on cooperation.

a new world order

In this case, the most important characteristics of the chosen path of development envisioned in this scenario may be described as modest, appropriate, harmless, small-scale and prudent.

Hungarian civil society and the government are already preparing for the above fundamental changes. They steer the country along a path that will lead to a totally new state of development in 40-50 years. This is based on high quality education, new skills and cultural standards and the widespread use of sophisticated technologies.

This scenario, therefore, describes a development with a much longer timescale (40-50 years) than the 15-20 years assumed in the previous two visions.

A CHANCE TO CATCH UP

Hungary has a good chance of closing the gap and catching up with the developed countries on the basis of its size, location and ability to adapt to international development and global changes. However persistent efforts and well-targeted actions are required to achieve this. Hungary's opportunities for development in the next 15-20 years will be determined to a great extent by the correct timing and adequacy of decisions made today, or the postponement or absence of these decisions. Competitiveness is becoming increasingly dependent on the generation and exploitation of knowledge in terms of the quality of education, training, R&D and innovation combined with the ability for permanent renewal, adjustment and learning.

long-term programmes

A high level of quality and performance in these areas may only be achieved by devising and implementing long-term programmes. The experts taking part in TEP fervently believe that our strategy will be the determining factor as to whether Hungary will be able to join global trends and take advantage of mutually beneficial cooperation.

We must embark on a path of development that ensures that our level of progression exceeds that of the medium developed countries of the European Union in the long term, particularly with regard to the highly knowledge-intensive sectors and the area of healthcare. A development which is socially, economically and environmentally sustainable should be central to our system of values along with the quality of life, the generation of knowledge and the activities required to accomplish these. At the same time, the social costs of closing the gap should not be unfeasibly high as the catching-up process should not lead to acute imbalances and tensions between different social groups and geographical regions of the country.

CONCLUSIONS AND RECOMMENDATIONS OF TEP

Our objective has been to contribute to the formulation of an active national strategy by way of over 100 detailed recommendations contained in the eight reports produced.

TEP recommends that policy making should be accelerated and concrete action should be taken in three main areas. The following pre-requisites should be achieved in order that the development gap may be closed:

- a population which is educated, exposed to continuous learning processes, cooperative, healthy and adaptable to the ever-changing surroundings, ideas, solutions and value systems
- a clean and healthy environment and
- an effective national system of innovation.

The formulation and consistent implementation of long-term programmes is essential to the attainment of these goals. It is also essential to the additional pre-requisites of the catching up process, namely the development of the info-communication and transport infrastructures and the improved competitiveness of companies. These long-term programmes should span several parliamentary election cycles and should be based on a wide political and professional consensus. The recommendations of the Steering Group and thematic panels provide the foundation for such long-term programmes.

The Steering Group of TEP has formulated the following 22 recommendations:

1. *Hungary should embark on a path of development that ensures that the long-term pace of advance exceeds that of the medium developed countries of the European Union on a continuous basis, particularly in the highly knowledge-intensive sectors and the area of healthcare. A development which is socially, economically and environmentally sustainable should be central to our system of values along with the quality of life, the generation of knowledge and the activities required to accomplish these. At the same time, the social costs of closing the gap should not be unfeasibly high as the catching-up process should not lead to acute imbalances and tensions between different social groups and geographical regions of the country.*

2. *The skills, values and knowledge that are being increasingly recognised by the global labour market and with the abilities necessary for lifelong learning should be*

strengthened at all levels of education. The following skills are of special importance:

- *the ability to learn;*
- *creativity and the recognition, definition and resolution of problems;*
- *the ability to filter huge masses of information and to access and utilise the necessary information;*
- *communication skills and abilities (proper use of the mother tongue and one /two/ foreign language/s/, application of up-to-date telecommunication tools etc.);*
- *the ability to cooperate, work in teams and work in a multi-cultural environment on multi-disciplinary problems.*

3. *The performance of the national education system should be assessed on a regular basis in order that catching up process is achieved. The financial resources for education should be significantly increased.*

4. *An indicator system should be established which measures the quality and efficiency of education and training on an objective basis and a monitoring network of organisations capable of implementing this should also be set up.*

5. *During the next decade it is essential that the total expenditure on education, as a ratio of GDP, should exceed the OECD average on a permanent basis.*[1] *In order to achieve this, we should strive to reach the top third of the OECD countries in terms of expenditure on education within the next five years and should maintain this position in the long term.*

6. *In order to facilitate the advancement of the information society, a comprehensive government programme should be formulated for the development of human resources. The most important goals and tasks of the programme are as follows:*

   - *information technology (IT) 'literacy' should be improved in wide areas of the population, particularly amongst the economically active generations;*
   - *to counterbalance the present low IT capabilities in households, opportunities to access modern info-communication tools should be provided free of charge to as many people as possible in traditional and new public institutions (e.g. schools, libraries, museums and tele-houses);*
   - *in the current transition period it is particularly important to provide basic education and training in IT for those generations who have already completed their education. Training of employees in the area of public administration also warrants a good deal of attention. In this area the education and training of teachers is of utmost importance;*
   - *the introduction of subjects and new methodologies based on interactive and IT tools into curricula should be encouraged, primarily in elementary and secondary schools. To this end the research institutes for education*

[1] The OECD average was 6 per cent in the middle of the 1990s which exceeded the same Hungarian indicator by half a per cent but this difference has since increased further.

methodology should be built up and their participation in international networks supported;

- *we should be prepared to upgrade the IT infrastructure of schools on a regular basis involving substantial and continuous increases in budgetary expenditure;*
- *in order to take advantage of potential business and employment opportunities, secondary vocational training should be improved in close cooperation with employers and in many cases through joint publicly and privately financed programmes. New, specialised education programmes should also be introduced in higher education.*

7. *The government is advised to study the feasibility of introducing 'education vouchers'.*

8. *A sabbatical system should be introduced for researchers working in higher education and public research institutes, providing the opportunity for one-year scholarships every 5-7 years. New state incentives should be introduced to facilitate the creation of similar opportunities for company researchers.*

9. *The government is strongly advised to expand the '**Programme for a Healthy Hungary**'. The time-scale of the programme should be 20-25 years, thus far exceeding the normal parliamentary cycle. It should also span several sectors, not concentrating exclusively on the healthcare system, be preventative in its approach and non-medicinal in its essence by removing medical treatment from the central focus of healthcare. The programme should concentrate on well-defined and clearly measurable goals such as solving the most serious public health problems and reducing the major causes of death.*

10. *The growing proportion of environmentally friendly products, services, methods and technologies in the national market should be considered a key aspect of economic policy-making. To this end the legal situation, the economic conditions and the information process should all be made stronger to encourage cleaner production.*

11. *Hungary should pursue a pro-active policy in adopting international environmental regulations. This policy should be based on a continuous monitoring and assessment of international trends.*

12. *To raise environmental awareness we should:*

- *establish environmental centres to formulate complex environmental protection programmes and develop environmental education and training;*
- *raise the level of environmental awareness in teacher training courses and accordingly strengthen the curricula of the relevant educational institutions. With regard to educational programmes providing for specialisation in natural sciences and/or technical fields, the qualification to teach these subjects should involve a high level of environmental knowledge;*
- *launch programmes that encourage the public to be sensitive to the environment, and promote material and energy saving activities;*
- *strengthen the communication and cooperation between the private sector, the*

government administration and civil society. The government has a leading role here.

13. *The advancement of the national system of innovation must be considered an integral part of the process to close the development gap and develop a knowledge-driven economy and society. It should be seen as an essential pre-requisite in both government policies and company strategies.*

14. *Measures aimed at developing the national system of innovation in the future should be taken and implemented. The following priorities should be considered:*

    - *there should be increased cooperation and more mobility between the research/education area and the business sector. Special attention should be paid to this aspect when devising government support/funding schemes for research and scholarship programmes;*
    - *the adaptability of Hungarian higher education should be accelerated and in this regard the links between the research institutes of higher education and the Hungarian Academy of Sciences (HAS) should be strengthened along with the cooperation between the universities and business entities. It should be common practice in five years for higher education to carry out a knowledge transfer function in addition to its research (knowledge generation) and education (knowledge transmission) functions. The commercialisation of knowledge generated in the higher education institutions and the research institutes of the HAS should be encouraged. In this regard special attention should be paid to the establishment of small, technology and knowledge-intensive enterprises and the affiliation with the research networks of international corporations based on strategic partnerships;*
    - *Particular importance should be attached to the development of transfer institutions, primarily information centres, industrial competence centres, organisations and research units based on the cooperation between the government, universities and industry, as well as technology incubators.*

15. *It is highly recommended that top priority be given to the following objectives in the future in order that the state R&D budget may be used more effectively:*

    - *company R&D expenditure should be increased at a rate which considerably exceeds the average. To this end we advise spending the majority of the future increase in public R&D expenditure to the facilitation of this process;*
    - *the rapid development of the domestic R&D infrastructure is essential, involving both private resources and investments. A high priority should be given to improving the quality of R&D equipment and the info-communication infrastructure and to reaching the level of developed European countries.*

16. *The Government should submit a comprehensive report to the parliament in 2001 detailing the indirect market incentives of domestic innovation and comparing conditions with those of OECD countries. The report should also include a medium-term development strategy and a schedule of legislative actions concerning this issue.*

17. *In 2001 the Government should assess the impacts of the venture capital law of 1998 and take appropriate measures to effectively encourage Hungarian capital market investments into innovation.*

18. *A cautious state procurement policy should also be introduced to raise demand for technology-intensive products and services. The most important areas are education, healthcare, public administration and national defence.*

19. *When setting long-term research priorities we have to prevent the interests of single scientific fields from dominating the process. The efficient operation of the national system of innovation requires knowledge generation and transfer in a wide range of scientific fields based on the cultivation of all the fundamental scientific disciplines. Contemporary scientific research lays the foundation for tomorrow's applications (technologies), rather than today's.*

20. *In the medium term, in the light of international trends and national strengths, particular importance should be given to significantly increasing support for and improving performance in the following two areas of technology:*
    - *life sciences (including biotechnology);*
    - *information and communication technology.*

21. *The current vertical decision and policy-making structures within the Government should be changed in order to meet the challenges which are becoming increasingly horizontal in nature.*

22. *To improve policy-making and strengthen strategic decision-making in the area of innovation, the Government should introduce the methodology and tools that are widely applied internationally in the field of innovation and should establish an adequate institutional network for their application and utilisation. To this end, the following government measures should be taken:*

    - *an investigation, in conjunction with the parliament, into the conditions for establishing a technology assessment institution in this country.*
    - *the establishment of a science and technology observatory to monitor the national R&D and technology innovation base in accordance with OECD standards and methodology.* [2]

[2] The operation of the centre as a government institution is advised with strong legal guarantees of professional independence which meet international norms and standards.

Introduction

The objective of the Hungarian technology foresight programme, TEP, is to make a contribution to improving the long-term competitiveness of the country resulting in a better quality of life for the people. TEP has identified key issues and decision-making points that are crucial to the development of the various economic sectors and the country during the next 15-25 years. The Steering Group and the eight thematic panels have analysed the current situation, outlined different scenarios for the future and made recommendations for the implementation of the most favourable one. The recommendations derived from the most favourable scenario will be addressed to those policy-makers who are in a position to have a direct or indirect affect on the future of the various sectors along with the development of the Hungarian economy and society as a whole.

The foresight programmes does not consider the future to be an unalterable consequence of current conditions and development trends, but as a state which is partly dependent on our present and future decisions.

Alongside the preparation of reports on different economic sectors, an important objective of the programme was to stimulate dialogue and cooperation between policy-makers in research, business and government communities.

cooperation

In addition to the government officials and programme advisors, a large number of experts took part in workshops and the large-scale Delphi survey. The two-year project concentrated on the following areas: human resources; health and life sciences; information technology, telecommunications and the media; the protection and development of the natural and built environment; manufacturing and business processes; agribusiness and the food industry; transport; energy.

Seven of these areas were examined by thematic panels consisting of 20-25 members. The reports were discussed at many workshops held across the country involving external experts. These debates aimed to benefit from the expertise of as wide a circle of professional communities as possible and to engage a large number of people in the future implementation of TEP’s recommendations.

The Delphi survey also helped to involve a wide area of professional communities in the process. The two-round, large-scale survey also provided an important tool for consensus building. (The eighth field, the energy sector, was analysed by a smaller panel of experts and discussed within a wider circle of experts at later stage without using the Delphi survey).

utilisation

The provision of information on new knowledge and technologies was not an objective of the Programme. Our aim was to present a comprehensive picture of the opportunities resulting from the application of new scientific and technological achievements, taking account of the ability of the Hungarian economy and society to absorb these achievements. In the context of the characteristics of an economy and society in

transition, TEP's efforts did not focus on the advancement of science and technology but on the commercial application of achievements in technology. In the light of this central importance was given to the regulatory and organisational changes and conditions necessary to improve the health of the population, the quality of education along and the lifelong learning process which would enable the application of these achievements in science and technology.

Hungary has a good chance of achieving a balanced economic and social advancement in view of its size, potential and the country's active participation in the main trends of international development.

adopting country

Concerted efforts and firm actions are required in many areas including education and R&D. It has become a common conviction among the experts that we cannot operate independently of international trends and cannot succeed without taking them into account. However, the possibility of joining the global trends and taking advantage of the opportunities arising from a mutually beneficial cooperation depend a great deal on our strategy.

The second chapter gives more detailed information on the objectives of TEP and describes its methodology. The third chapter provides an assessment of the selected sectors, the fourth chapter contains an outline of the scenarios and finally there is a summary of the most important conclusions and the recommendations for implementing the most favourable scenario.

Objectives and Methodology of TEP

The primary input factors of competitiveness today are knowledge, R&D results and the ability for continuous renewal in a process where cheap labour and the availability of inexpensively exploited natural resources are losing in importance. The creation and application of new scientific and technological knowledge enhances the competitiveness of the economy and improves the quality of life. In the light of this policy-makers in many countries are coming to realise that companies as well as countries should also devote more intellectual and financial resources to carrying out the kind of research which plays a part in solving problems of strategic importance. This approach is crucial for the identification of new opportunities and challenges and the exploitation of these to improve competitiveness.

Efforts to institutionalise joint thinking on current and future opportunities in the fields of science, technology, the economy and society have been gradually gaining in importance within the governments and business communities of the developed European countries since the start of the 1990s, following the example of a much earlier initiative along similar lines in Japan.

The basic goal of the above efforts is to combine intellectual resources and knowledge in order to identify new opportunities and set priorities. Technology foresight, therefore, is a broadly applied, institutionalised dialogue that provides the public and private sectors with a stock, or 'inventory', of tools and methods for the purpose of making strategic decisions.

The role of technology foresight in strategic decision-making

The launch of TEP in Hungary became both possible and essential due to the level of development achieved by the second half of the 1990s. The enhancement of competitiveness and the improvement of the quality of life became top priorities during this second phase of social and economic transformation, replacing the previous primary aim of day-to-day survival. These goals are addressed by assessing and analysing opportunities and resources and by devising and implementing adequate strategies. Technology foresight is one of the most effective tools of collecting and analysing information. Joining the European Union may only be considered successful if an improvement in the performance of the Hungarian economy and in the living conditions of the population may be observed.

questions

TEP sought answers to the following questions:

- Which social and economic trends will unfold in the next 15-25 years? What kind of opportunities will be created by research and technology development and innovation in these areas and what kind of problems should the researchers address?
- In which ways may the country's resources be exploited most effectively to achieve economic prosperity and improve the quality of life?

- What kinds of changes are necessary with regard to regulation and government policies?

DEFINING THE GOALS AND PRIORITIES OF RESEARCH

Today, private firms are even more unwilling to finance very expensive research programmes on their own. Firstly, the uncertainty of research is extremely high and therefore the assessment of risk is a very complicated process. Secondly, the dissemination of results and the wide-scale utilisation of new products and manufacturing processes are in the best interests of society which means that competitors also benefit from this exercise. The innovator is therefore unable to realise the full yield from its investment. In order to share the burdens of R&D, competitors conclude agreements with each other and/or seek public support. However, the latter version is only acceptable in democracies where the taxpayers' money is spent on R&D programmes with well-defined goals which have been delineated in wide-ranging and transparent professional debates. The taxpayers' money has also to be accounted for if it is spent at state universities or public research institutes. Nowadays even the largest and wealthiest countries cannot afford to fund every research proposal no matter how promising. TEP's analyses and recommendations contribute to the identification of research goals and priorities in the long term.

CONSENSUS BUILDING AND TRANSPARENCY

Over the past decades there has been an increasing need to control research programmes and the application of their results by the public. Certain technologies – e.g. information technology, biotechnology and nuclear energy – have such a profound effect on our lives that decisions concerning the manner and scope of their application cannot be left to a small number of experts and politicians. Technology foresight helps to build consensus both between different professional groups and at a social level.

INTERDISCIPLINARY APPROACH

R&D is becoming progressively more interdisciplinary in nature. The number of overlapping, generic technologies of great economic importance is also increasing. Consequently there is a growing need in society to use new methods and tools in the assessment and strategic decision-making processes. Conventional methods of fund allocation for R&D (e.g. peer review) uphold the system and hamper the emergence and development of new scientific fields. The methods of technology foresight enable us to link different research areas and consider the overall impact.

ASSISTANCE IN STRATEGIC PLANNING

Technology foresight programmes may assist in devising long-term strategies by promoting dialogue between researchers, company managers and government officials and by identifying different alternatives for strategic decision-making.

Methodology of the Hungarian Technology Foresight Programme

Technology foresight differs greatly from previously applied policy-making tools and methods. In comparison with other methods its main characteristics are the systematic

portrayal of assessment results based on the collection of data and the application of assumptions. The participants in the foresight exercise did not only comprise government officials and programme advisors, as thousands of experts were also involved. Alongside the preparation of analyses and reports, an important objective of the foresight programme was to stimulate dialogue and cooperation between the researchers, business managers and government officials.

methodological innovation

TEP, in line with the British exercise, used both the Delphi survey and the thematic panel review process (snapshots, scenario building and recommendations). It also introduced an important methodological innovation, namely the portrayal of macro-scale visions of the future (scenarios). This method was chosen due to the profound social transformation occurring in the basic institutions of the Hungarian economy and society.

The thematic panels[3] analysed the following seven areas:

- Human resources
- Health and life sciences
- Information technology, telecommunications and the media
- The protection and preservation of the natural and built environment
- Manufacturing and business processes
- Agribusiness and the food industry
- Transport

The panels prepared their reports by analysing the anticipated economic, social and market trends along with trends of development in the fields of science and technology. They made recommendations in respect of the most favourable and feasible scenario defining those crucial junctures where major economic, social and/or technological decisions should be made. No research on natural or social sciences was therefore conducted by the panels. Their goal was more to carry out a 'secondary' analysis of the results achieved so far and to assess their potential impact on the future. The reports were widely discussed at workshops held across the country, involving a great number of external experts. In this way the expertise of as many people as possible could be utilised and these experts could also be engaged in the implementation phase.[4]

Delphi survey

The other method of consensus building was the Delphi survey. The two-round, large-scale survey devised and carried out by the panels was based on the following factors: future events significantly influencing advancement; commercialisation and the application of science and technology achievements; their expected time horizon; social, economic and environmental impacts; anticipated difficulties in development; and the conditions of the given area in Hungary as compared to the industrialised European countries. More than 1,400 experts took part in the survey. On the one hand, they

[3] The eighth area, the energy sector, was assessed by a smaller group of experts and discussed in a wider professional circle at a later stage without using the Delphi survey.
[4] A total of more than 100 workshops were organised in the country.

provided information by completing the questionnaires and on the other hand they also received information through the comments made by others. There was also a feedback loop in the information process as the answers of the first round were included in the second questionnaire. The results of the Delphi survey enabled the identification of certain trends providing practical value for both business and government policy-makers.

A snapshot

In what kind of world do we wish to find our place?

RAPIDLY CHANGING SETTINGS

In the beginning of the 1990s, fundamental changes started to take place in the world economy. Their outcome may not be clear as yet however we are in a position to adapt effectively to these changes and create the conditions for a mutually beneficial cooperation by analysing and taking into account a number of important inter-connections and overlapping effects. The methods and efficiency of generating, using and disseminating knowledge and information are having an increasing effect on determining competitiveness and therefore the quality of life. This process is taking place in a world economy which is becoming ever more global and in which the relatively cheaply available natural resources and labour are losing their importance.

knowledge-driven economy

This process provides for the new and increasing role of knowledge, advanced technologies and information technology in economic performance. This phenomenon is reflected in the terminology of the ‘knowledge-driven’ or ‘learning’ economy.

networks

New areas of knowledge and new skills may only be linked successfully if there is a close cooperation between small and large enterprises (even competitors!), universities and research institutes. The boundaries between the formerly separate industries and markets are becoming indistinct and new competitors are emerging who were previously kept at a distance by strong barriers. This is most apparent in the areas of telecommunications, information technology and the media. An increasing number of countries are liberalising their markets and are also attracting foreign direct investment and privatising state monopolies through deregulation and new incentives. Actual physical distance is losing in significance due to the advancement of the technologies concerning information, telecommunication and transport. An increasing number of products and services are therefore only to be achieved profitability on a global scale. Developments in technology, deregulation, privatisation, globalisation and the synergies of these effects are leading to a totally new socio-economic environment for companies.

new casting and new tasks

The roles and tasks of nation-states are also changing. Governments are required to possess sound knowledge of the nature and driving forces of the profound changes whilst laying down the rules and frameworks for the ‘new game’. In some cases there is a need for governments to take on an increased role in the establishment of regulations as deregulation is accompanied by re-regulation. There is an urgent requirement to re-think the basic principles of regulations in a number of areas in view of the aforementioned technological and economic changes.

In more general terms, new principles and tools should be established with regard to regulations at sector-specific, national, regional and international levels. The division of responsibilities (casting) and tasks among the different players should also be re-considered.

NEW REQUIREMENTS: CHANGING VALUES FOR INDIVIDUALS AND ORGANISATIONS

National economies that try to isolate themselves from globalisation will be left behind permanently. The same future awaits countries that are unable to offer mutually beneficial strategies to their foreign partners, particularly to multinational corporations, and that are not prepared for the competition which is taking place in a new environment and under new regulations. These countries will become dependent on the more visionary and competitive players in the world economy and will become subordinates in the global division of labour.

adapting

The rigid hierarchies will be replaced by so-called 'flat' organisations, which are flexible, adapt continuously to the ever changing environment whilst tapping into and exploiting more and more resources through networking. Consequently, individuals will need more than the knowledge acquired during their school years and will have to learn continuously throughout their whole life. The ability to learn, adapt and solve problems will become increasingly important in comparison to encyclopaedic knowledge.

new skills

Individuals will often have to work in teams composed of persons of different cultures. In a number of cases the members of such teams will only meet on a virtual basis, for example, through the Internet. Therefore skills relating to the ability to work with other team members and to understand and link knowledge of previously separate and isolated professional fields will become essential.

This may, however, result in severe stress since many individuals can hardly cope with the constant demands for achievement and adaptability on top of with the disappearance of the boundaries between work and leisure time.

The scenarios outlined and the recommendations made by TEP should be understood in this broader sense as the tasks to be accomplished may not solely be limited to the area of R&D or even to the wider domain of technological innovation. In line with the goals of TEP, the experts were obliged to analyse complex problems: e.g., in what way can we develop a society that is educated, healthy and adaptable? How can we preserve and advance the natural and built environment? What should we do to improve our competitiveness?

a comprehensive approach

The TEP experts applied a comprehensive approach to address the above issues with a particular focus on scientific and technological development factors and on the aspects and components of the regulatory, organisational and value systems.

Where are we now?

Remarkable results have been achieved in Hungarian economy and society in the past decade, particularly in the area of enhancing competitiveness. However, if we take a long-term approach to the factors determining competitiveness, such as the competitiveness of different industries, the quality of human resources, infrastructure or the state of the biosphere, several issues are apparent which cause concern and call for action.

ACHIEVEMENTS AND TENSIONS OF THE TRANSITION

sacrifices

It is an everyday phenomenon but also a complex controversy[5] that considerable sacrifices are still required from our citizens in the establishment of a democratic society and market economy to replace an inefficient, monolithic and planned economy, even in the tenth year of transition.

An example of this is the fact that in 2000 consumption in the country did not reach the level of 1989. This level may be achieved in 2001 but even then it will occur on an average basis with much wider differences in private wealth and incomes than before. In addition, Hungarian society has to accept and live with the phenomena of unemployment, decreasing job security, the deterioration of state-provided services, the increasing polarisation of incomes and private wealth, a dramatic decline in public safety and increasing corruption and abuse of legal regulations.

achievements

The achievements, however, are remarkable: the elimination of the shortage economy, the strengthening of competition, the achievement of right to private ownership, the enhancement of the international exchange of cultural, scientific and technological values and the creation of better conditions for foreign relations. The annual growth rate of the economy has amounted to 4-5 per cent since 1997 and domestic consumption has also increased considerably.

There is now an historic opportunity for Hungary and the other Central and Eastern European countries to integrate into the economically and socially developed part of Europe. This will not, of course, 'automatically' eliminate the aforementioned negative factors.

a chance

Nevertheless, embarking on a dynamic course of development may gradually compensate for the disadvantages. It could lead to the achievement of the socio-economic transformation and will simultaneously enable integration into the EU and allow us to adapt to the changes taking place in the world economy.[6]

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[5] Tardos (1999)

[6] There is an ongoing debate around the world on the positive and negative effects of globalisation. This debate also includes the potential ways and means of how to influence or limit them. Hungary, due to its

General crisis of the planned economy

By the end of the 1980s and the beginning of the 1990s severe economic crises were apparent in all Central and Eastern European countries and, partially as a result of these, profound political and social crises also emerged. Despite the illusions of many, the changes in the economic system took place amidst a severe economic decline.

There was a considerable drop in GDP in each of these countries.

Table 1: Development of GDP between 1990-1999 (in real prices; 1989 = 100)

	Hungary	Czech Republic	Slovakia	Poland
1990	96.7	99.6	99.6	88.4
1993	81.8	79.2	76.7	86.9
1996	86.6	88.5	91.5	103.9
1998	95.0	85.5	101.1	116.2
1999	99.2	88.5	103.0	121.0

Source: CESTAT Statistical Bulletin

creative destruction

The recurring problems regarding the balance of payments[7] leads to the assumption that the conditions for sustainable growth and the establishment of an institutional structure to meet the demands of the changing world economy may only be achieved through 'creative destruction'.

There is no way to avoid taking destructive measures, which may result in conflicts, although governments tend to postpone 'destruction' to avoid social tensions. However the delay in reforms leads to widespread social tensions, having a negative effect on the economy both in terms of losing domestic and foreign economic balance and resulting in increased inflation. The consistent achievement of market economy reforms and the re-organisation of the institutional structure is the basis upon which the crisis may be overpowered and a sustainable development in the post-socialist countries may be attained. They include privatisation, creating an environment that provides better conditions for advancing the market economy, strengthening the competitiveness of enterprises and restructuring the state budget system. These measures are necessary to achieve a better allocation of resources, increase foreign investment and attain a more efficient utilisation of domestic capital – in short: the modernisation of the post-socialist economy. The key question is, therefore, how to improve the country's capabilities in the closely inter-related fields of utilising capital, increasing investment inflow and accumulating capital.

small economic and political significance, should consider both the process of globalisation and the influence of international institutions as external conditions to which we must adapt.

[7] For illustration purposes: the deficit in Hungary's current account balance in 1993 and 1994 was around USD 3.5-4.0 billion. In the Czech Republic in 1996 it was USD 4.3 billion and in the much smaller Slovakia it reached USD 2 billion in 1998.

Transition of the Hungarian economy

In 1990, the proportion of state ownership was over 90 per cent in the Hungarian economy. By 2000 this had reached almost the opposite end of the scale with private ownership representing almost 80 per cent. A similar change took place in the structure of GDP: the contribution to GDP of the private sector was some 25 per cent in 1990, increasing to 90 per cent by 2000.

Table 2: Volume indices of GDP and its composition between 1990-2000 (preceding year = 100)

	1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000***
GDP	96.7	88.1	96.9	99.4	102.9	101.5	101.3	104.6	104.9	104.4	105.2
Industry	92.4	82.2	93.3	104.4	105.9	107.0	103.3	111.4	112.5	108.4	109.2
Agriculture	95.4	91.9	83.4	92.1	99.6	102.7	104.2	98.2	99.7	102.4	96.5
Personal consumption	96.4	94.4	100.0	101.9	99.8	92.9	96.9	101.7	104.9	104.6	103.3
Investment	92.9	89.6	97.4	102.0	112.5	95.7	106.3	108.8	112.7	105.9	106.6
Domestic utilisation	96.9	90.9	96.4	109.9	102.2	96.9	100.8	103.8	107.8	104.2	n.a.
Exports	95.9	95.1	102.1	89.9	113.7	113.4	107.4	129.9	122.5	113.1	121.8
Imports	94.8	105.5	100.2	120.2	108.8	99.3	105.7	126.4	124.9	112.3	121.1

* Preliminary data
Source: Hungarian Central Statistical Office (HCSO)

Due to the reforms and stabilisation efforts of the previous decade and as a consequence of a realistic monetary and fiscal policy, a sustainable economic development was achieved by 1998-2000.

Table 3: Statistical data on the balance of the Hungarian economy between 1990-2000

	1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
Consumer price index (preceding year = 100)	128.9	135.0	123.0	122.5	118.8	128.2	123.6	118.3	114.3	110.0	109.8
Balance of trade (in billions of USD)	0.9	-1.2	-0.4	-3.6	-3.9	-2.6	-2.4	-2.1	-2.7	-3	-4
Current account balance (in billions of Euro)	0.1	0.2	0.2	-3.0	-3.3	-1.9	-1.3	-0.8	-2.0	-1.9	-1.9
Number of registered unemployed at the end of the year (thousands)	80	406	660	632	520	496	478	464	404	405	372
Balance of the state budget without privatisation revenues as a ratio of GDP	0.3	-2.9	-7.0	-5.6	-8.4	-6.8	-3.1	-4.6	-6.3 (-4.6**)	-3.7	3.4

Net foreign debt including loans from parent companies (in billions of Euro)	11.8	10.9	10.8	13.4	15.4	13.1 (12.7*)	11.7*	10.7*	11.0*	11.2*	12.2*

* In a combination of convertible and non-convertible currencies
** Not including the consolidation expenditure of Postabank, the Hungarian Bank for Development and State Privatisation Agency.
Source: HCSO, Ministry of Finance

Legal and institutional framework

All the major components of the legal and institutional framework of a market economy have now been established in Hungary. A number of important tasks still remain, however, including the achievement of legal harmonisation with the EU and the continuation of state budget reforms. The institutional structure of economic policy-making and its implementation have been significantly re-organised. The independence of the Hungarian National Bank is guaranteed in law. The state budget was restructured into independent sub-systems and its deficit is funded by the capital market. The financial institutional sector was completely restructured. The banking system became a two-tier system, competition emerged in the commercial banking and insurance sectors, and large numbers of consultancy and brokerage firms were established. The Competition Office is now in operation and extensive reforms have been introduced in the social security system.

Company behaviour

Affiliation with international production networks is having positive effects on the performance of companies. Foreign-owned enterprises or companies with extensive international links form the overwhelming majority of companies in Hungary which are achieving good results both in export and domestic markets.

According to the unanimous opinion of the experts, foreign-owned companies could have exerted even stronger positive impacts if they had relied more on domestic suppliers. However it is essential that the quality management of domestic suppliers is improved before the links between large companies and suppliers may be strengthened. The process is being achieved organically and is being driven by the multinational companies. Large foreign suppliers are interested in establishing production capacities in Hungary and Hungarian companies situated at the bottom of the suppliers' pyramid are also becoming able to join the expanding suppliers network.

Development of financial and capital markets

The two most important factors here were the establishment of a two-tier banking system in 1987 and the opening the stock exchange in 1990 following the enactment of the law on securities and bonds.

Professional foreign investors acquired the majority of the shares in the large domestic commercial banks with the exception of OTP and Postabank. The international ratings of the Hungarian commercial banks are favourable and fierce competition initiated a dynamic concentration process in the Hungarian banking sector. Banking activity as measured by the GDP ratio of the balance sheet is still far behind that of the developed countries.

The consolidation of the insurance sector took place between 1990-93 which compensated for the capital deficit of 50 billion HUF accumulated before the start of the transition. This consolidation was primarily implemented by the new foreign owners but the costs were in fact borne by the customers. The establishment of voluntary and compulsory social security funds facilitated the dynamic development of this sector. These social security funds are able to play an important role as investors both in the financial and capital markets of Hungary.

Reform of the state budget system

Even in the middle of the 1990s, the level of budgetary expenditure was 10-15 per cent higher than that of the developed countries at an average of 40-45 per cent. The country's economy was therefore disproportionately dominated by the Hungarian state budget system.

At the beginning of the 1990s the budget deficit grew at an increasing rate while the GDP declined sharply. It became evident that in spite of the heavy tax burdens the deficit could no longer be funded at such a high level of budgetary expenditure.

The accumulated deficit limited the development opportunities of companies, constrained economic growth and fostered inflation. It also contributed to the increase in foreign debt. Consequently, interest expenses and loan instalments increased which considerably limited the scope of the fiscal policy. This tendency was also reflected in the decrease in the share of expenditures on investment, which had already been deteriorating since the beginning of the 1980s. This trend, combined with the problems of the relative backwardness of the infrastructure, also constrained economic growth.

No consistent reforms were carried out in the state budget structure during the first decade of transition despite a growing realisation of the problems. As a result of repeated attempts in several important sub-systems, reform-like measures were introduced but were also withdrawn in some cases. The reform measures led to the establishment of four state budgetary sub-systems. In addition to the already existing central budget and earmarked state funds, the social security fund and the municipality budgetary funds were created which function independently of the central state administration. The following steps may be considered as milestones in the reform process: the establishment of the State Audit Office (1989), the separation of the social security system from the central budget (1989), the creation of the municipalities budget (1990), the enactment of the law on the Central Bank (1992), the acceptance of the law on the state budgetary system (1992), the establishment of the Office for State Bonds (1993), the enactment of the law on public procurement (1995), the establishment of the State Treasury (1996), the radical decrease of the number of earmarked state funds (1996 and 1998), the extension of the retirement age (1996), and the reform of the pension system (1997).

The consolidated expenditure of the state budgetary system as a proportion of GDP fell below 50 per cent as early as 1996 and dropped to 46.6 per cent in 1999. However the changes introduced led to severe problems in some areas.

controversial transformation

The main problem to affect the social security system was the ‘vanishing’ of some 1.5 million social contribution payers from 1990 onwards. The revenues side was not able to accommodate this loss as the necessary reforms were not in place. The social security system was restored to state ownership by the government in 1998 as an ‘ill-functioning system’ although it is difficult to decide whether the conditions for a better operation have now been created. Changes in the system provided a broad autonomy for municipalities. In practice, however, their economic independence is limited since their revenues are generally scarce and differ considerably from one another. The dependence on the state is overwhelming in the current financing system due both to the level of central financial support and the frequent changes in the rules regarding its allocation. Municipalities using their assets to finance their short-term expenses are a negative but frequent occurrence.

Although there is apparent agreement on the principles and objectives regarding the reform of the state budgetary system, each step towards the advancement of the process has led to clashes of interests in both the professional and political arena. The most important goals ahead of us include the further rationalisation of the role of the state, the expansion of the scale and scope of individual and local autonomies and the achievement of a more efficient operation of the social allocation systems.

The role of the state should be to provide full-scale and free state services in the areas of healthcare and public education at basic and secondary levels, social services, government administration, jurisdiction, national defence and law enforcement. It should support the services provided in higher education, special healthcare, science, culture, sport, environmental protection, urban and rural development, infrastructure development and communal utilities/services. It should also be involved in the performance and competitiveness of the Hungarian economy.

In 1999 the GDP of the Hungarian economy was 99.3 per cent of the level achieved in 1989. Therefore, after experiencing the lowest point in 1992-93, it took until 1999 to approach the level of economic performance achieved before the transition. The structure of the manufacturing and service industries in respect of their size, distribution channels and markets changed fundamentally as the reform process took place.

industry

The liquidation of over-sized and non-productive industrial capacities was a necessary exercise. Competition from imports also weakened the local market position of Hungarian companies together with the decrease in the demand from internal and external markets. At its lowest point in 1992, the volume of industrial sales was some 30 per cent behind the level of 1989.

The manufacturing industry stabilised as early as 1992-93 following its decline and dynamic growth was experienced from 1994 onwards. The machinery industry proved to be the most successful in managing the crisis although in 1992 it suffered the second largest drop in output of all industries after the metallurgy industry. The machinery industry, the only one in the industry sector, reached the production level of 1989 as

early as 1996 by implementing fundamental structural reforms and gaining new export markets. The industrial sector as a whole only achieved this result in 1998.

A shift from a labour-intensive production to a material and components-intensive production became apparent constituting a specific characteristic of the country's industrial restructuring. Another positive trend was the improved orientation of the industrial sector towards exports. The level of autarchy declined as a consequence of the above changes however the degree of cooperation in the industrial sector increased leading to intensified participation in the international division of labour.

agribusiness

Agricultural production declined to a similar level as industrial production between 1989 and 1993 however this trend was followed by slower growth.

It has now become clear that this was primarily due to the lack of new capital inflow, both domestic and foreign. Agriculture has still not recovered from the crisis and the conditions for a stable and sustainable development have still not been established. Unsettled ownership conditions continue to prevent agricultural businesses from becoming competitive. There is a lack of effective government support and the rapid development of transparent and stable market conditions is not in the interests of some influential interest groups.

domestic trade

The volume of retail trade decreased by around 30 per cent between 1990 and 1997 despite the fact that the number of retail stores approximately doubled.

Since 1997, however, economic growth has generated increasing domestic demand which has led to a significant growth in the volume of retail trade. This will result in a decrease in the number of shopping centres, supermarkets and retail stores, initially those in the food sector. The structural changes are reflected in the fact that the number of new business (new start-ups or shops sold to new owners) was in the range of 30 thousand per year between 1998 and 2000, and that the number of shops closed down grew from an annual rate of 15 thousand to 23 thousand in the same period. Competition in the sector is very strong.

International trade

The export trends of the 1990s may be divided into two distinct periods. The total volume of exports decreased by 20 per cent in the first four years due to the collapse of the CMEA market and difficulties with shifting markets. This equated to a slightly higher drop than that experienced in the GDP.

Between 1994 and 2000, however, total exports increased on average by 18 per cent per annum, which considerably exceeded the GDP growth rate. The growth rate in the exports of the Hungarian economy may be considered dynamic even on an international scale. Export growth in the machinery industry was particularly remarkable. It almost tripled between 1994-1998 and even the period of 1999-2000 recorded an annual rate of 35 per cent. The fastest growth has been registered in the exports to the European Union. In 1990 only one-third of total exports went to the European Union but this level reached 70 per cent in 1998 and 75 per cent in 2000. Three-quarters of total exports are produced by affiliates of international companies.

The strong increase in domestic demand resulted in a growth in imports which exceeding the dynamics of exports.

labour market

Between 1990 and 1996 the total workforce decreased by 1.5 million to a nominal level of 4.0 million people constituting a decline of almost 30 per cent. Two-thirds of the decrease was registered in the first three years. There has been an annual growth of 1 per cent in the average number of employed persons since 1996. The number employed in the business sector decreased substantially whilst hardly any decrease was apparent within the government administration.

Agriculture and industry suffered the heaviest losses. Production declined in the sector of agriculture and changes in ownership structures led to a loss of approximately two-thirds of the officially registered workforce. The actual number of persons making a living in agriculture is probably higher than the statistically registered level as many non-registered people work in this area as family members.

The radical increase of unemployment in the first half of the 1990s took place with no visible social conflicts in Hungary. This may be explained by the unemployment benefit system which was very generous at its inception. However the avoidance of conflicts was also a result of 'closing our eyes' to the increasing black economy.

investments

The volume of investments generally corresponded to the decline in GDP generation after 1990. The decline in consumption levels, however, came well after the economic decline and led to an increase in debt. In Hungary, the investment rate reached its lowest point in 1993 at the level of 18.9 per cent and increased thereafter on a continuous basis to a level of around 24 per cent by 2000. (In 1989 this indicator was 21.6 per cent).

The volume of investments in 1992 was approximately 80 per cent of that in 1989 and was able to achieve the level of 1989 by 1997.

consumption

At the same time, the consumption rate (as a percentage of GDP) increased from 72 per cent in 1990 to 88 per cent in 1993. This decreased as a result of the stabilisation measures, dropping to 80 per cent by 1995 and to 77 per cent in 1996.

Consumption reached its lowest level in 1996 at 17 per cent lower than the level in 1989. An increase has become apparent in consumption since 1997 but is still lagging behind the GDP growth rate. The consumption growth rate of the country continues to decrease.[8]

[8] Real wages also reached their lowest level in 1996 (namely 76 per cent of their 1989 level). In two years, thus by 1998, real wages increased to 83 per cent of the 1989 level but had not even reached 90 per cent of the 1989 value by 2000.

foreign investments.

The process of privatisation, creating real owners and transparent ownership structures, played a very important role in Hungarian achievements. The high level of foreign investment, which was outstanding in the region, also made a great contribution.

regional differences

Despite Hungary's small size there are significant differences in the degree of development between the regions. The role of the central region in the economy, especially that of the capital, is superior and continues to increase. Per capita GDP in Budapest exceeded the country's average by 80 per cent in 1994, 85 per cent in 1996 and 86 per cent in 1998. Budapest's contribution to GDP amounts to around one-third of the total.

The favourable economic trends taking during the large-scale restructuring of the 1990s primarily benefited Budapest and Western Hungary whilst the unfavourable changes added to the problems of Northern Hungary and the Eastern part of the country. These two trends resulted in a widening gap between the more and less developed regions of the country. Development in each of these regions during the past decade has resulted in a slight improvement in the situation. However in practical terms this improvement only serves to keep the gaps between the regions unchanged and prevents a further relative decline of the less developed parts of the country.

KNOWLEDGE GENERATION AND APPLICATION: THE NATIONAL SYSTEM OF INNOVATION IN HUNGARY

Many illusions have been apparent in Hungary during the past ten years of the transition period with regard to the role of market forces in the encouragement of innovation activities. One of the illusions was that scientific knowledge automatically becomes technological ability, precluding the need for transfer mechanisms and intervention to facilitate this process.

Illusions and ideologies: striving for modernisation without a comprehensive innovation policy

Another perception that was especially strong in the first half of the 1990s was that innovation was the product of a strong economy rather than the basis of economic development. ('We will spend more on R&D when we have the necessary surplus in the budget…'). A fervent belief was still apparent at the end of the decade that that science was a luxury and a privilege of a small elite.

Some of the above illusions were refuted by the domestic and international trends during the past decade. It has now become evident that the transition to a market economy does not automatically lead to a better performance in innovation and that market mechanisms alone are not enough to develop a dynamic and efficient national system of innovation.

Innovation did not feature amongst the priorities of Hungarian government policies in the last decade; far from being an unfulfilled objective, it was not even mentioned. The structure of the government's R&D administration has undergone continuous change since the start of the transition. This was partly due to the uncertainty of the policy-

makers regarding the role that should be played by the government in innovation. However the lobby groups interested in innovation also had less influence on the policies made by government and the development strategies formulated.

The role of companies in innovation

Companies, which are an integral part of the innovation process, were severely hit by the first period of the transition. State subsidies were ceased in a very short period of time at the end of the 1980s and the beginning of the 1990s. Furthermore the effects of imports, the liberalisation of COCOM and privatisation had a considerable effect on the economy. Competition became very fierce for average Hungarian companies and their previous competitive abilities and skills diminished in value. Similarly, the pressure to find new export markets in a very short period of time in history has created a very different and difficult environment for Hungarian companies. The only companies able to survive were those who had begun to re-focus on exports much earlier or those who held strong positions in the Western markets (e.g. the pharmaceutical industry).

Most companies embarked on the path of passive survival, selling some of their assets and scaling back production to serve their short-term interests. It was not an accident that the R&D divisions of many companies became the first victims in this period. The scope of R&D organisations decreased considerably or even disappeared. Applied research institutions operated and maintained by the state had particular difficulties as they had no contract work and the state ceased almost all financial support for them due to the conditions in the market economy. It is likely that valuable research capacities and formal/informal networks, which could have operated efficiently under the present market economy conditions or in the future, were lost in this process.

foreign owners

The first round of privatisation, producing real owners for companies, proved beneficial to innovation activities. Foreign capital also played a significant role in this process which primarily started as ‘creative destruction’ in the country.

Foreign direct investment was the main source of the technological and organisational changes during the 1990s. The economic growth, the increase in exports in the manufacturing industry and the positive changes in the export structure during the second half of the 1990s were primarily attributable to companies with major foreign investments. The favourable conditions in Hungary, namely the well-qualified work force and political stability, caused multinational companies to introduce high technology manufacturing activities at their Hungarian subsidiaries (IBM, Nokia, Ericsson, GE Tungsram, Audi, Ford etc.). Many of the new owners recognised the importance of in-house R&D during these years, mainly in the technology-intensive industries such as automobile manufacturing, electronics and telecommunications. They initially introduced product and process development activities and some of them established R&D units in Hungary at a later stage. This resulted in the establishment of high-quality company research capacities in the region, some of which were unique and excellent (GE Tungsram, Knorr-Bremse, NOKIA, Ericsson, Audi, etc.). These R&D units constitute an integral part of the national system of innovation and may become instrumental in improving the Hungarian R&D base. The Hungarian government reacted in time to this increasing interest of foreign capital and stimulated R&D investment through competitive support schemes.

small enterprises

The other characteristic feature of the Hungarian economic transition was the wide-scale emergence of small firms in the first third of the 1990s. Many of them were set up out of necessity (they are sometimes called 'forced enterprises') and still operate in this way today. Others were formed within the liquidation or reorganisation process of the formerly state-owned companies and relied on exploiting market, production or knowledge potential.

On the basis of their inherited knowledge and equipment, the latter have often succeeded and have achieved remarkable results even in export markets with exacting demands. Many of them invested heavily in technological innovation due to market pressure however sometimes exceeded their limits. The growth of these organisations on a permanent basis is in danger especially in technology- (equipment-) intensive sectors. Several small enterprises were established with a view to commercialising innovative ideas. Many of them, especially in the technology-intensive areas, were founded well before the change in the political system and continue to operate today in global markets, offering special skills, knowledge and high quality in different market niches (e.g. Kürt Computer and Graphisoft). A number of small, technology-intensive enterprises were established during the 1990s and their viability has been proved by their very existence over a period of ten years. The encouragement and support for the growth of SMEs should be a fundamental objective of innovation and economic policy in Hungary.

This objective regarding SMEs was also aided by efforts aimed at developing the supplier network during the past decade. Most of the government measures taken supported the volume growth of low value-added production activities, namely those companies located at the second and third layers of the supply pyramid. Policies aimed at small enterprises placed little emphasis on providing financial support for growth potential, improving technological capacities, encouraging innovative start-ups, or promoting the establishment of competence centres that would improve levels of knowledge and technology within the economy.

dual economy

A significant imbalance is evident in the structure of the Hungarian economy. On the one hand there are international corporations using high-tech applications, operating with high efficiency and focusing primarily on exports. On the other hand, there are mostly small or medium-sized indigenous enterprises which lack capital, have low growth potential and can hardly withstand their lack of competitiveness even in the Hungarian market. Only 14 of the 33 largest export companies (accounting for 41.6 per cent of the total export market) carry out R&D activity in Hungary, equating to a total of 42 per cent.

63 of the top 100 exporting companies, accounting for 55.9 per cent of total exports, are majority-owned by foreign shareholders. Only 23 of these 100 companies conduct R&D activities in Hungary, 14 of which are owned by foreign companies. This means that only 22 per cent of the large, foreign-owned, exporting companies carry out R&D

activities in Hungary. The foreign-owned companies possess significant knowledge bases, technological potential and R&D capacities, although not necessarily in Hungary. However the Hungarian-owned companies are primarily only able to rely on their domestic resources to maintain or improve their export performance.

Universities and research institutes

Conditions within the 'primary' knowledge base (universities and research institutes) were quite difficult during the past decade. Their previous business network disappeared almost entirely and demand for their research activity decreased significantly. This community reacted to the profound changes in a defensive manner while trying to keep their resources intact. In line with the political and social changes, the autonomy of higher education institutions and the Hungarian Academy of Sciences have increased significantly. The right of higher education to award scientific degrees was reinstated and real efforts were made to bring the activities of higher education and the Hungarian Academy of Sciences closer. Their fundamental development became established in law in 1994 and the decade has seen a significant increase both in the number of students in higher education and in the proportion of students in the relevant age group.

efficiency and quality

This trend has raised the problem of efficiency and quality in higher education. There is a significant 'perception deficit' in the Hungarian scientific community with regard to the role of science in a modern, knowledge-driven society. Very strong views still exist on 'absolute' scientific autonomy which opposes the stricter accountability and wider public control arising from the increased social responsibility of science.

transfer institutions

Institutions that facilitate the dialogue, communication and technology transfer between the 'primary' knowledge base and businesses are becoming progressively more important. The roots of such institutions had already developed before the fundamental change in the political and economic system. The international aid provided to Hungary in the first part of the 1990s was partly aimed at establishing such organisations. Incubators, technology and science parks were founded in the country in the absence of a genuine market-pull and motivations regarding policy played a greater role than market interests in this respect. The development of the domestic market and the appearance of a new generation of managers since the middle of the decade have caused market factors to gain in importance. Profit-oriented technology services (e.g. technology brokers) have emerged in the country which also strengthens the transfer network.

Impacts of the international cooperation

The Hungarian R&D sector has reacted in a very quick and positive manner to the international political changes caused by the Central and Eastern European transition. This process was aided by personal and institutional ties and the experience gained from international cooperation over the past decades. In the first half of the 1990s, Hungary became a member of a number of European R&D programmes (e.g. COST, EUREKA) and organisations (e.g. CERN, EMBO) and it has also increased its cooperation with the European Union in the field of R&D. Hungary also signed a number of new

intergovernmental (bilateral) science and technology agreements which were based on project-oriented cooperation. Today Hungary has agreements on S&T cooperation with 29 countries and is running a total of around 500 projects.

Financing innovation

A negative development was registered with regard to the financial resources devoted to innovation activities. This trend was determined by the aforementioned views on the interrelationship between R&D and the market and was shaped by the major forces of economic transition. The state budget, which was in a very difficult situation for almost a decade, did not compensate the R&D sector for the decline in market demand. Short-term interests also played a dominant role in the allocation of public expenditures. Consequently R&D expenditure as a percentage of GDP declined significantly at the same time that the GDP was itself shrinking. (Table 4.) By 1999, total R&D expenditure dropped to 84.6 per cent of the level in 1991 in real terms.[9] Contrary to the majority of OECD countries, Hungarian monetary and fiscal policies provide hardly any indirect measures to stimulate innovation.

Table 4:R&D expenditure (at current prices and as a percentage of GDP)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
R&D expenditure, GERD (in billions of HUF)	24.5	23.4	26.4	28.6	36.0	39.7	44.4	57.2	67.6	74.0
R&D expenditure as a percentage of GDP	1.61	1.09	1.08	1.00	0.93	0.75	0.67	0.74	0.70	0.68

Source: Hungarian Central Statistical Office

There was a concomitant drop in the number of personnel engaged in R&D activities, however the decline did not start in 1990. (Table 5). R&D personnel as a percentage of the total workforce had declined significantly and reached a value of 0.55-0.58 per cent at the end of the decade. (Chart 1.) In the first third of the decade, when the country experienced the most significant decline in this regard, the general unemployment rate was also very high. Taking this into consideration, it would not be an overstatement to say that society reacted to the changes in the same way as the enterprises, namely by sacrificing long-term resources to 'put out the fires' occurring in the short-term.

Table 5: R&D personnel (full-time equivalent)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
R&D personnel	36384	29397	24192	22609	22008	19585	19776	20758	20315	21283
Researchers and engineers	17550	14471	12311	11818	11752	10499	10408	11154	11731	12564
Other	11711	8903	7152	6003	5922	5207	5114	5205	4907	5017

Source: Hungarian Central Statistical Office

Figure1

9 A

Chart 1: R&D personnel as a percentage of the total workforce

Figure 1: R&D personnel as share of active workforce (per cent)

Source: Hungarian Central Statistical Office

R&D expenditure and its allocation are key indicators of innovation funding. There was a dominant level of state support dominated in the 1990s although its relative volume has decreased in the last three years. Budgeted R&D expenditure produces a curve in the form of a wave with the maximum values always coinciding with the dates of general parliamentary elections. Expenditure by enterprise (BERD) decreased until 1993 and then showed a continuous increase thereafter. By the end of the decade this trend had led to an increase of company expenditure in real terms. Over the decade there has been a continuous rise in expenditure from so-called 'other sources', roughly half of which came from foreign sources, primarily the European Union.

Figure 2: Distribution of R&D expenditure by source (per cent)

Source: Hungarian Central Statistical Office

An unfavourable development has taken place with regard to the regional allocation of R&D expenditure. The dominance of Budapest is considerable in this regard and two-thirds of the total R&D expenditure was spent in the capital in 1998. R&D activities were, however, practically non-existent in certain regions, for example the areas of Vas and Zala which are close to Austria and are considered to be economically successful parts of the country. If financial support for R&D were portrayed on a map, this would reveal that the geographical distribution of R&D spending is primarily determined by the presence of research institutes (universities, academic research institutes) rather than by the economic strength of the regions.

The low proportion of investments within total R&D expenditure is one of the main characteristics of the crisis management years of the 1990s. (Table 6.) At the start of the last decade the volume of R&D investments decreased radically even when compared to the general investment level of the economy which was itself depressed. R&D investments had increased slightly by the end of the decade but remained far from adequate. The narrowest development gap was apparent in the info-communication infrastructure due to the contribution of the National Information Infrastructure Programme (NIIP) since 1985 to the ongoing upgrade of the computer and telecommunication networks of higher education and the research institutes of the Hungarian Academy of Sciences. Conditions with regard to research instrumentation have also been improved through impulse-like 'injections' due to support from both PHARE resources and domestic public R&D grant schemes. One feature of the past

decade was the fact that institutes tended to be closed down rather than new ones inaugurated.

Table 6: Allocation of R&D expenditure (billion HUF)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Total R&D expenditure	24.5	23.4	26.4	28.6	36	39.7	44.4	57.2	67.6	74.0
Running costs	21.2	21.2	23	25	31.3	35	39.1	49.1	56.2	61.3
Investment	3.3	2.2	3.4	3.6	4.7	4.7	5.3	8.1	11.4	12.7
R&D investments as a percentage of total investments	1.27	0.45	0.72	0.67	0.65	0.56	0.5	0.48	0.53	-

Source: Hungarian Central Statistical Office

underdeveloped capital market

The domestic capital market is underdeveloped in respect of financing innovation according to international standards. Although venture capital emerged in the country in the mid-1990s, its volume has remained very modest. Even so, several indigenous technological innovations have been successfully commercialised due to these types of investments. The law in 1998 regarding venture capital has not come up to expectations and in practical terms has achieved no new resources for technical innovation.

The players in the domestic capital markets tend not to look in the field of technological innovation for their investment goals. However, the emergence of the so-called ‘business angels’ in Hungary is a favourable development.

The public R&D funding system was also fundamentally re-organised during the transition period. In the mid-1980s, a financial support allocation scheme meeting international standards was founded in the field of basic sciences (National Science Research Fund – NSRF). In 1991 the government introduced an allocation scheme based on principles similar to those of NSRF in the field of market-oriented applied research (Central Technological Development Fund – CTDF). At the outset, the primary focus of these funds was to preserve anything of value while simultaneously pointing the researchers’ interests in the right direction by increasing competition and stressing merit and quality.

The Hungarian government has followed the relevant international trends closely throughout the decade with a view to making adequate policies and applying proper measures for innovation. The first piece of comprehensive analysis in this field was a study by OECD on the state of R&D and innovation in Hungary, followed by another OECD report auditing the resources of selected industries in respect of technology and knowledge. However the recommendations of these documents were not implemented due to the government’s lack of motivation to do so. There are at present no ongoing studies commissioned by the government and acceptable in respect of international standards to assess and analyse the R&D and innovation activities in the country on a regular basis.

shortcomings of innovation policy

Furthermore, there has been no independent organisation established in the country to evaluate the 'primary' knowledge generating institutions (government and Academy research institutes and higher education research units) on an objective and transparent basis. The launch of TEP, the Hungarian technology foresight programme, is a step in the right direction but may only be considered successful if the reports do not share the same fate of the previous strategic documents on innovation. Hungary is lagging behind the OECD countries in the application of science, technology and innovation policy tools.

In summary, the Hungarian innovation system has changed a great deal over the past decade. Some positive measures came out of the changes in the system and the management of the economic crises which characterised the transition period. However the development of the innovation system as a whole is still driven to a lesser extent by market forces than by government 'push', which is often based on actions which are ineffective, strategically inconsistent and inefficiently founded. The already weak innovation networks fell apart, the links between the economy and the 'primary' knowledge generating institutions (universities and research institutes) diminished. Valuable assets were lost but at the same time the basis for a – hopefully – more efficient innovation system were created. Today the links between the different players in the system are weaker than anticipated and the radiating effects of networking are not yet at work. Only occasional communication takes place within the system and this is at a low level. The institutional structure of technology transfer is underdeveloped and innovative ideas are frequently unable to reach the market. Nevertheless the late 1990s witnessed definite and positive changes with strengthening market-pull creating a growing demand for new knowledge and its application. In the next 5-10 years the priority of economic policy should be aimed at reinforcing the current, basically positive trends and establishing an efficient and strong national system of innovation. The seeds are there to achieve this.

EDUCATION

The relationship between the quality of human resources, the financial and other means devoted to its advancement and the development of the economy is quite complex. Nevertheless, the importance of this multi-layered system is uncontested in respect of the future development of the country.

changes

The 1990s saw several significant changes in the Hungarian education system. State education became more wide-ranging and the institutional structure also changed a great deal. The importance of secondary schools offering 6 or 8 years of schooling increased as a result of the ability to compensate for the decline in enrolment and the associated financial problems.

A favourable development may be seen in the growing flexibility and diversity of the curricula. The rate of school attendance grew significantly by 1999/2000. The increase favoured secondary schools offering the higher school leaving certificate (*érettségi*), with secondary schools that offer schooling up to pre-university level (*gimnázium*) accounting for 32 per cent of students and specialised secondary schools for 39 per cent.

Nevertheless, the expansion of the secondary school system did not occur quickly enough to counter the decline of vocational schools or meet demographic changes. In the post 17-year-old age group Hungary still lags behind the developed countries with regard to the rate of school attendance.

The collapse of a large number of companies posed a great challenge for traditional vocational education. Since then new financial and other initiatives have increased the role of the business sector again with regard to practical training however it still lags behind the desired level in respect of its influence on the content and structure of vocational education.

One of the most positive changes that took place in the last decade is the significant increase in the number of students attending higher education. The ratio of higher education attendance within the relevant age group grew even faster than the nominal figure. The number of students increased to a greater extent in colleges rather than in universities, although expansion was evident in all longer-term education programmes. Despite the fact that accredited tertiary education in vocational training has been introduced in the country, its role is still far weaker than expected. The supply structure of higher education has only been able to meet the demand for education by the students on a slow and inflexible basis, as is shown by the entry applications. There is a similar situation in the labour market with regard to response to demand. The competitiveness of the country requires a broader higher education system.

financing

The proportion of GDP spent on education in Hungary is not disconcertingly low compared to international standards although it was lagging behind the OECD average even in 1995 (Table 7).

The gap has increased further due to general cuts in public spending in the subsequent years. The increase in education spending has not kept in line with the accelerated growth of GDP which took place after the successful macro-economic consolidation. Per capita expenditure calculated in real terms decreased considerably, primarily in those areas where increases could be seen in the number of students (secondary and higher education). A decrease in the per capita expenditure on education, calculated in real terms, may be an indication of an improvement in efficiency.

The salaries of teachers are low. Their wages lag far behind the income levels of people with same qualification in the business sector. This leads to acute problems in the quality of education. The problems have also affected the performance of the students: a decline in performance is evident, when measured on an international basis, in the subjects where Hungarian education was traditionally strong (such as mathematics and natural sciences). The quality of education is greatly dependent on the location of schools. Therefore the phenomenon of ‘the smaller the settlement, the lower the quality of education quality’ prevails. In this respect the differences between the various types of settlements increased continuously during the 1990s. The widening of the gap between the types of settlements is especially apparent with regard to the performance of 8^{th} graders and in reading tests.

differences in opportunities

Due to the aforementioned gaps in quality, the education system has not been able to reduce the differences in social opportunities within the country. The situation of gypsy children is a particular problem despite the recent introduction of special programmes.

The education system of the country is based on the 'Prussian' style, which may be characterised by a lack of openness. They do not prepare the students adequately for the future as the skills required for continuous education, cooperation, communication and problem solving techniques are not developed. They primarily transmit information which should then be recited. The involvement of employers in the formulation of curricula, teaching methods and education demands is still very rare.

Table 7: Education expenditure by source and level of education as a percentage of GDP - 1995

Country	**Basic and secondary levels**			**Higher (tertiary) education**			**Total expenditure**		
	For educational institutions		Total expenditure	For educational institutions		Total expenditure	For educational institutions		Total expenditure
	Public expenditure	Public and private expenditure combined	For institutions from public and private sources + public support for households	Public expenditure	Public and private expenditure combined	For institutions from public and private sources- public support for households	Public expenditure	Public and private expenditure combined	For institutions from public and private sources – public support for households
OECD countries									
Australia	3.2	3.7	4.0	1.2	1.8	2.0	4.5	5.6	6.1
Austria	3.8	3.9	3.9	0.9	1.0	1.0	5.3	5.5	5.6
Czech Rep.	3.4	3.9	4.2	0.7	1.0	1.1	4.8	5.7	6.0
Denmark	4.2	4.3	4.9	1.3	1.3	1.9	6.5	7.1	8.5
South Korea	3.0	3.8	3.8	0.3	1.9	1.9	3.6	6.2	6.2
USA	3.5	3.9	3.9	1.1	2.4	2.4	5.0	6.7	6.7
UK	3.8	n. a.	n. a.	0.7	1.0	1.3	4.6	n. a.	n. a.
France	4.1	4.4	4.6	1.0	1.1	1.2	5.8	6.3	6.6
Finland	4.2	4.2	4.4	1.7	1.7	2.1	6.6	6.6	7.3
Greece	2.8	2.8	2.8	0.8	0.8	0.8	3.7	3.7	3.7
Netherlands	3.0	3.2	3.4	1.1	1.3	1.6	4.6	4.9	5.4
Iceland	3.4	3.6	3.7	0.7	0.7	1.0	4.5	5.2	5.5
Ireland	3.3	3.4	3.6	0.9	1.3	1.5	4.7	5.3	5.7
Japan	2.8	3.1	3.1	0.4	1.0	1.0	3.6	4.7	4.7
Hungary	***3.3***	***3.6***	***3.7***	***0.8***	***1.0***	***1.2***	***4.9***	***5.5***	***5.7***
Mexico	3.4	4.0	4.0	0.8	1.1	1.1	4.6	5.6	5.6
Germany	2.9	3.8	3.9	1.0	1.1	1.2	4.5	5.8	6.0
Norway	4.1	n. a.	n. a.	1.5	n. a.	n. a.	6.8	n. a.	n. a.
Italy	3.2	3.2	3.2	0.7	0.8	0.8	4.5	4.7	4.7
Portugal	4.1	4.1	4.2	1.0	1.0	1.0	5.4	5.4	5.5
Spain	3.5	4.0	4.1	0.8	1.1	1.1	4.8	5.7	5.8
Switzerland	4.1	n. a.	n. a.	1.1	n. a.	n. a.	5.5	n. a.	n. a.
Sweden	4.4	4.5	5.1	1.6	1.7	2.3	6.6	6.7	7.9
Turkey	1.4	1.6	1.7	0.8	n. a.	n. a.	2.2	2.4	2.5
OECD-	*3.4*	*3.7*	*3.8*	*0.9*	*1.6*	*1.7*	*4.7*	*5.9*	*6.0*

Some non-OECD countries

Chile	2.3	3.4	3.4	0.4	1.8	1.8	3.0	5.6	5.6
Israel (1996)	4.7	4.9	4.9	1.2	1.8	1.8	7.0	8.3	8.3
Malaysia	3.3	3.4	3.4	1.1	1.2	1.2	4.9	5.1	5.1

Source: OECD (1998) – based on Tables B1, 1a, 1b and 1c

HEALTH

The health of the country's population is a cause for concern. The unusual factor is that it is much worse than expected given the level of the country's economic performance. The most significant public health problems are posed by non-infectious chronic illnesses, most of which could be prevented or postponed by well-targeted actions.

population decline and life expectancy

The country's population has been declining since the 1980s due to the decreasing birth rate and high mortality rate. Declines in population may also be generally observed in the developed countries however the situation with regard to the number of circulatory diseases amongst the middle-aged male population and in respect of malignant tumours is alarming.

The mortality rate of the middle-aged male population is reminiscent of that of the 1930s. It is therefore not surprising that the average life expectancy at birth of Hungarian males (66.3 years) is nine to ten years below the same indicator in Austria, Japan, Switzerland or Sweden, and it falls five years short even in comparison to similar data in the Czech Republic. The mortality rate of women in the age group of 40-54 is also higher than it was forty years ago. Although the average life expectancy at birth of Hungarian females (75.1 years) is nine years higher than that of the male population, it is still six to seven years lower than the same indicator in Belgium, Finland, France, Greece, Italy, Austria, Norway, Spain, Switzerland and Sweden.

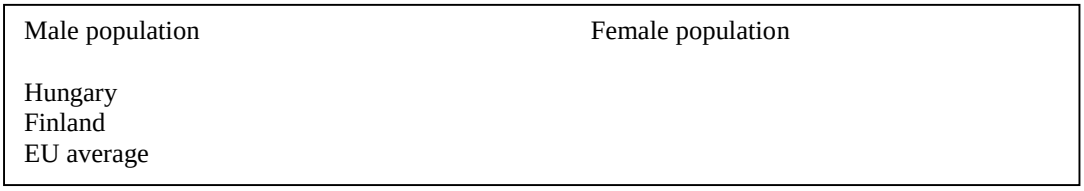


Figure 3: Mortality rate of the age group of 0-64

*Standard: 0-64 year-old, standard European population
Source: HFA database, 1998

If we were successful in lowering the mortality rate to that of the EU average, the population decline in Hungary would be curtailed.

Table 8: Major causes of death, Hungary – EU average, 1995, thousands

Causes of death	Hungary	Supposing that the EU-average prevailed in Hungary	Difference
Circulatory disease	38	12	26
Tumours	32	15	17

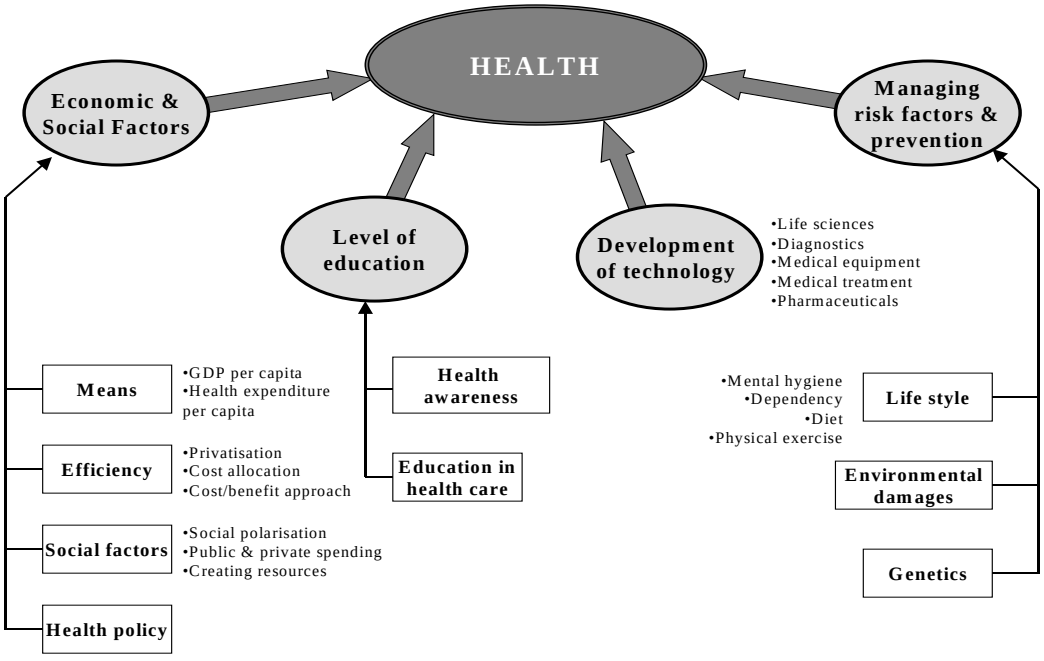
Liver disease	13	2	11
Total	83	29	54

Source: Ádány and partners, 1998

The age distribution of the population has also undergone an unfavourable development in line with European trends: The proportion of the 65-and-above age group of the total population has almost doubled group since 1949, increasing to 14.6 per cent in 2000 from 7.5 per cent in 1949.

The findings of international research show that the healthcare system is not the most important factor influencing the quality of health of the population. The key factors, such as environmental effects, genetic factors and the way of life, are affecting more than the quality of the healthcare system. More detailed analyses also take other influencing factors into consideration.

Figure 4: Health system



The quality of the Hungarian healthcare system is generally much better than the health of the population would lead us to believe. The reason for the disparity is that the population groups that need the healthcare services the most are the ones that use them the least. On the other hand, most people only see a doctor when real medical problems have already occurred. As far as the way of life is concerned the level of health awareness is very low in the country. Smoking is widespread, alcohol consumption is extensive, the diet is unhealthy and physical exercise and sports are only practiced to a very limited extent among the population. The role of education and the raising of public awareness are very important in this respect.

prevention

All experts agree that prevention is the key to the resolution of the existing problems. The resources of the large prevention programmes in the 1990s were allocated on a competitive basis, were spread too thinly amongst too many sub-programmes and had practically no impact. Despite the evident causal relationship between basic knowledge on illness prevention and health conditions at the lowest level, the relevant subjects are not currently part of the curricula in Hungarian schools.

The healthcare system today comprises the coexistence of the state, municipality, non-profit making and private ownership forms. With regard to public healthcare services, only the state and municipality services play a significant role. Basic medical services are dominated by municipality-owned facilities assigned to private entrepreneurs. Saving jobs and avoiding unemployment in the healthcare and social service systems is only made possible by keeping salaries low. The number of physicians is too high in relation to the population.

efficiency

The international tendency prevailing in the 1990s of increasing expenditure on healthcare was not applied in Hungary as there has been no increase in healthcare resources in the country during the last decade. During the period, tensions have escalated to such an extent in some areas, such as salaries, that even the short-term operation of the system is endangered.

There are a number of factors in the institutional structure of healthcare and its management which decrease efficiency. The objective of a healthcare system reform, to be implemented as soon as possible, should be to accomplish 'systemic changes' in the sector.

A number of new tools and methods for improving efficiency, based on science and technology, have emerged which have not yet been brought to public attention. International experience has shown that the increase in healthcare costs may be decelerated by a wider application of new tools brought about by the information revolution (e.g. tele-medicine, healthcare data bases, patients' chip cards etc.).

ENVIRONMENT

13 per cent of the country's air is polluted in areas inhabited by half of the population. With regard to water quality, Hungary has an inadequate sewerage system[10] and problems with water drainage.[11] However in respect of recreational water the average water quality of Lake Balaton has improved. These adverse features of environmental pollution have resulted in the widespread occurrence of respiratory diseases and malignant tumours and an increased the propensity to allergies.[12]

[10] The percentage of flats and houses with running water supply exceeded 90 per cent in 1998 but less than 50 per cent were connected to sewerage systems.

[11] Changes in ground water levels are extreme: in some areas between the Danube and the Tisza river the level decreased by 2.5-3 metres, while in the Trans-Tisza region it increased by the same extent compared to the average ground water levels of 1950-1960.

[12] The level of allergy illnesses in the population has reached 40 per cent. The registered cases of asthma and bronchitis increased to 13,718 in 1998 vs. 820 cases in 1980. The pollinosis cases have increased four-fold since 1988.

unfavourable effects

Biodiversity has deteriorated.[13] Decreasing levels of industrial waste are apparent however the level of communal waste is increasing.

The Hungarian environmental policy aims to substantially improve the present situation and approach the level of EU norms and regulations. The resulting conditions would form the basis of a better environmental protection and a sustainable development of the economy and society. The environmental regulations accepted in the past few years as part of the EU harmonisation process have already been implemented. This has also led to an increased importance of environmental aspects in economic activities.

R&D expenditure on environmental protection and nature conservation was estimated to be 9 billion HUF in 2000. One favourable trend may be seen in the fact that we are importing and applying more advanced technologies and methods with regard to environmental protection by way of investments. On the other hand it is evident that domestic R&D resources are shrinking. In environmental R&D activities and technological developments the so-called 'end-of-pipe' technologies are dominant.

TELECOMMUNICATIONS AND TRANSPORT INFRASTRUCTURE

In the past few years the infrastructures of information technology, telecommunications and the media in the country have undergone profound change. The previous waiting lists for telephone lines have disappeared giving way to a supply market and the market is close to being fully liberalised. The extent and penetration of mobile telephony has exceeded all previous expectations. At the same time some services are going out of business (e.g. telex) or are still operational but 'under-used' compared to former expectations (e.g. paging). One of the main problems in the telecommunications sector is the relatively high price of services. Hungarians spend too much on telecommunications relative to their incomes, which may constitute a slow-down factor in the advancement of the information society. During the privatisation process of this sector substantial revenues were realised by the state budget while the burdens of the high prices for services are borne by the domestic customers.

development and backwardness

The number of personal computers connected to the Internet is increasing rapidly however the growth rate is still slower than in some other medium developed countries. The computer networks of the public sector have also shown remarkable development over the last few years.

The R&D computer infrastructure of the information and telecommunication sector is fairly even on an international scale. However the educational institutions, public museums and archives in general are lagging behind with regard to information technology, both in the volume and the quality of equipment. Intranets have spread amongst companies in the past few years, and twenty per cent of employees were able to access these in 2000, using Intranets for in-house e-mailing or reaching electronic information services. Ten per cent of company employees have access to the Internet.

[13] 40 species of flora have been lost since 1750, 9 of which disappeared between 1951 and 1975. 11 species have become extinct since 1976. The loss of fauna included 53 species between 1850 and 1980, 18 of which were vertebrates (e.g. beaver, brown bear, wolf, lynx, peregrine falcon, capercaillie) and 35 invertebrates.

broadcasting

The ground and satellite facilities of electronic broadcasting have been developing steadily and operating in a proper manner, providing services for most of the population at an appropriate level. Furthermore the operation of cable TV systems was introduced at the end of the last decade.

The cable systems will form the basis for service providers to prepare for and meet competition on the telecommunications and Internet markets. The last few years has witnessed a rapid development of large information and telecommunications systems. These constitute the highest level of the information society infrastructure and will determine the everyday life of society in the future.

equipment manufacturers

The companies manufacturing information and telecommunications equipment have experienced a very difficult period during the past ten years. Their sales declined to a great extent after the political changes. The establishment of new companies and the revitalisation of some of the old ones resulted in the production volume of the sector exceeding even the highest levels of the previous period by the start of the new millennium. The quality of the products was also significantly higher. The local value-added at several companies using high technology is also considerable. Based on international trends, it is highly likely that the sector will develop dynamically in the years to come. The sector is also well placed to catch up with the leading manufacturers of the world.

transport

The structural changes regarding owners/operators and the EU harmonisation process have also commenced in the transport sector. The share of state ownership fell to 54.3 per cent (based on registered capital) by 1998, 51 per cent of which is expected to be maintained in the long term.

The remaining infrastructure is either in municipal ownership (30.5 per cent) or in private hands (15.2 per cent). In the latter case, the share of foreign ownership is increasing on a continuous basis (at present it is only 3.8 per cent of the total). The inflow of foreign direct capital into the transport sector was particularly evident in the area of motorway construction. Privatisation has contributed to the establishment of market conditions and competition in some sub-sectors (e.g. road transport). In other sub-sectors (e.g. railways, water, air and mass transportation) state ownership and service monopolies have been maintained (in some cases at 100 per cent).

underdeveloped infrastructure and outdated vehicles

The introduction of new technologies has commenced in some areas of the transport infrastructure (for example, electronic safety systems for high-speed railways, navigation package services for road transportation) and in certain categories of the vehicle fleet. Despite these efforts the domestic transport system is still largely considered as backward.

Scenarios

Structure and variables of the scenarios

Three macro scenarios (alternative futures) have been formulated following lively and often fierce discussions. These scenarios describe the course of development of Hungarian society, its most important components, its conditions and its situation at a crossroads in its history. The time horizon of the first two scenarios is 20-25 years but that of the third one is considerably longer at 40-50 years. All three scenarios are based on the assumption that neither internal nor external conditions will force Hungary from the road of a multi-party democracy and a market economy. The scenarios may be depicted as cells of a two by two matrix with the columns representing whether Hungary actively pursues a firm, well-designed strategy and the rows describing any fundamental structural changes in global settings or the ways and means of decision-making in corporations and international organisations.

	Active strategy	**Drifting (no strategy)**
No major changes in the global settings (with regard to values, norms, and the operation of large corporations and major international organisations)	**Cooperative partnerships** Hungary implements an active strategy characterised by a high degree of integration and based on mutual benefits and a high level of knowledge-intensity	**Drifting** Hungary, having no strategy, is forced into the current system of international division of labour along a low-skill and low-wage path
Fundamental, structural changes occur within global settings	**Alternative development** Hungary is integrated into a new, 'green' world pursuing an active strategy along a knowledge-intensive route	

Figure 5: Three scenarios

Hungary has already extensively joined the international division of labour, partially through ownership structures and partially via trade links. The country has become a full or associated member of the most important international organisations. Given the above conditions, the scenarios are not founded on the country's isolation or exclusion from major world trends. The alternative is also not worthy of being elevated to the rank of 'scenario', namely the occurrence of fundamental changes in world structures and values with Hungary, being unprepared for these, not seeking a course of mutually beneficial cooperation and development. However, the form of integration is very important which is why the variable '*activity*' (or '*strategy*') deserves special attention and has been given particular focus. This variable reflects the role of motivation, including attempts, efforts and actions of the business, government and civil areas of society.

the form of integration

The '*high*' score of this variable indicates a case in which we look for the most beneficial opportunities, partners and strategies in the light of our own strengths and weaknesses along with international trends. On the other side, the '*low*' score indicates a situation in which we passively accept our fate, thereby just preparing to survive and drifting with the flow.

One of the most important characteristics of the future scenarios, *knowledge-intensity*, measures the level of indigenous knowledge and its role in the international division of labour. Knowledge intensity is connected to the variable '*activity*' to such an extent that the Steering Group has decided not to use it as an independent variable.

knowledge-intensity

In practice we can disregard the possibility that a country would deliberately choose a course of development of low knowledge-intensity and would strive to build an economy with low value-added, resulting in poorly paid jobs and a stagnating domestic market due to low demand.

The other important component of knowledge-intensity is the level of manufacturing technologies that we use and apply when joining the international division of labour. Naturally, this does not only depend on our intentions and efforts. We can, nevertheless, have a positive influence on the investment, network-building and other business activities of foreign partners. This is best achieved by having a well-educated domestic workforce and a flexible, open and cooperative attitude to adapting and developing new products, manufacturing processes, services and management techniques. If the score of this variable is '*high*', it implies that the contribution of indigenous knowledge to value-added is significant, enabling high salaries which stimulate the domestic market. In this case enterprises and infrastructures using advanced technologies, or those close to the high-tech level, have an increased presence in the economy. A '*low*' score for this variable indicates a low level of local value-added in the economy. (In this case the integration strategy is based on the temporary competitive advantage of a labour force which is not highly educated, but is disciplined and located close to the European markets).

Cooperative partnerships (Scenario 1)

SUMMARY OF THE SCENARIO

This scenario sees Hungary being integrated into the world economy along the path of high knowledge-intensive development. This is achieved by the implementation of an active, mutually beneficial strategy which also respects the importance of the quality of life of the people. The milestones to be achieved along this route are as follows: a significant increase in support for the generation and utilisation of knowledge, a high level of priority for health and the environment and an improving solidarity and social cohesion. Alongside active government policies and measures, the developing role of civil society will play a crucial part in the implementation of this strategy together with a close cooperation between government institutions, civil organisations and business communities.

One of the basic assumptions of this scenario is that Hungary will become integrated in the international organisations, the global economic and social trends and will join the European Union within ten years. This will be accompanied by targeted government policies and will involve the active participation of the civil and business sectors along with a high knowledge-intensity. This strategy will result in a significant improvement in the quality of life of the population and will enable us to catch up with the middle-developed countries.

CURRENT TRENDS

The realisation of this scenario is dependent on many conditions and forces of change. However, many phenomena are also at work which may prevent its progression. Despite the fact that most of the important legal and economic institutions of private ownership and the market economy have been established in the country, the current level of corruption and the presence of the black economy significantly reduces the range and efficiency of government measures and actions. The high quality of education, which had been a characteristic of Hungary for decades, is essential to the implementation of the given course of development. However, in the last few years several indicators have warned of the deterioration in the quality of education. The low proportion of per capita GDP spent on education and health may also hamper the realisation of this scenario.

EXTERNAL CONDITIONS

In this scenario the world economic environment remains favourable thereby increasing the demand for knowledge-intensive products and services. The creation and expansion of these products is supported by a wide-ranging cooperation. The international community meets the global challenges endangering welfare economies. On an international scale, there are no sudden large-scale disasters. The situations in the Balkan states and within Russia become stable. Positive changes occur in our foreign relations and other countries from our region join the European Union along with Hungary, namely Poland, Slovenia and the Czech Republic. Democracy in Romania and Slovakia strengthens and they pursue a policy of active cooperation with Hungary. The Hungarian economy also participates in the revival of the Ukraine and Yugoslavia. These factors may contribute to the development of a more dynamic regional market in Central and Eastern Europe. Furthermore, we assumed that there would be no global environmental catastrophes. In this respect action may be taken to curtail the current unfavourable tendencies which will prevent the emergence of acute global problems.

THE PROCESS

The vision of the future differs from the current situation primarily in the assumption that the relationship between the government, the economic players and civil society must be harmonic in a country which has a firm strategy and is in the process of integrating into the world economy at level of high knowledge-intensity.[14] The most

[14] We may imagine a scenario in which an economy of high knowledge-intensity is integrated into the globalising word economy by a commanding state. However the chosen score of the „*activity*" variable of this scenario automatically determines that the economy and the civil society are independent and that they have their own strategy.

important element of the process leading to the given vision of the future is to re-organise the relationship between these three areas.

An important crossroads is represented by the decision regarding the extent of the country's willingness and ability to increase the volume and efficiency of human capital investments. This relates to both to education and training and also healthcare and family policy. A mentally burdened, frustrated, fragmented and inadequately educated society is unable to respond to challenges in a creative manner. Our vision of the future, therefore, assumes an active role for the state in this area. The scenario also assumes that the state will delegate some of its roles to the other two players in accordance with the principle of subsidiarity. This should significantly strengthen the national system of innovation. The enhancement of the role of environmental aspects in economic decision-making is a similarly important question. There is also a need for firm government involvement in this area which will mainly take the form of raising awareness, formulating regulations and investing in the prevention and reduction of pollution. The raising of environmental awareness in society may lead to relatively quick expansion of environmentally friendly technologies in the country.

CHARACTERISTICS OF THE SCENARIO

These measures will lead to a great change in human, social, environmental, economic, infrastructural and political conditions by 2020.

The level of education of the population will increase and higher (education) degrees will become common. The strict borders between education, work and leisure will be eliminated or changed significantly and more diverse careers will emerge in society. Education will become lifelong, enabling increased adaptability to the changes in the demands of labour markets and technological development.

education and new skills

Education methods focus on developing creativity and imparting skills regarding problem solving, communication, cooperation and managing conflicts. Literacy in information technology is equally as important as reading and writing. There is a common objective to obtain more than one professional degree which increases the role and importance of post-secondary education. The proportion of students taking part in foreign education programmes is high and extensive exchange programmes also take place between Hungarian universities, secondary schools and the educational institutions of the EU countries. The knowledge of at least one or two foreign languages becomes common amongst the young and middle-aged population groups. The training of the older generation becomes a particular feature of education leading to increased utilisation of their abilities and also an enrichment of their lives.

equal opportunities

The access to education and the acquisition of creative knowledge should not just be available to a minority. The principle of equal opportunity also prevails in this area (complemented by a well-devised and targeted government policy, an appropriate support system and private initiatives).

Teacher training remains in line with social demands. The level of education of teachers and respect for them (including higher salaries) also increases. A quality and

performance-based salary system in higher education limits the brain-drain effects in foreign educational/research institutions and the business sector.

Alongside teaching and learning, increased importance is given to the cultivation of personality. This includes raising the awareness and the degree of knowledge regarding social and environmental responsibility and a healthy way of life. Extensive international integration has led to the wide recognition that personality cultivation, best practices and prevention are more effective means of fighting social deviances than deterrence or punishment.

neighbours

Government and civil organisations – with the active involvement of companies – pay great attention to utilising these relations as a means of improving Hungary's image and enhancing its attractiveness to the European Union and foreign investors.

Educational and cultural relations become particularly close amongst the Central European countries.

Research careers become attractive and working conditions in R&D improve substantially. Researchers therefore work on intellectually challenging social and economic problems with access to a wide range of computer/telecommunication networks, equipment, books and journals and their efforts are also reflected in their salaries. The rigid separation between domestic and foreign employment disappears and most Hungarian researchers participate in international programmes. In line with the needs of a learning economy, close links are developed between universities, research institutes and companies. This is not only implemented by way of long-term contracts on cooperation but also at the level of researchers. Many of them are personally connected to educational/research institutions and also to companies as employees leading to the more rapid application of the results of research. Research and education programmes are focused on real social and economic problems and are flexible to changes in requirements.

health of the population

The health of the population improves significantly, both physically and mentally. The rate of illness decreases significantly due to the improved environmental and social conditions, preventative methods, healthcare programmes, the enhanced monitoring programmes based on advanced technologies and the development of diagnostic and therapy methods. Similarly, the number of so-called civilisation illnesses (such as depression) decline due to the higher level of education, changes in life-style and the enhancement of social cohesion. Most of society conserve their health, increase their leisure activities and mass sport is widespread. The healthy way of life as a social value gains in importance and is also reflected in diet. All citizens are entitled to a well-defined area of basic health care services. Basic and outpatient services are privatised in their entirety whilst hospitals operate primarily on a non-profit making basis. Public funding remains the dominant means of financing healthcare and the percentage of private health insurance holders among the population is around 15-20 per cent.

Growing prosperity is accompanied by a decrease in social polarisation. Economic growth creates new jobs and unemployment falls due to the increase in part-time jobs and flexible employment along with the impact of the so-called eco-tax reform[15].

social differences

The middle class becomes the majority class in society and a wide stratum of wealthy and socially active citizens is created. Differences in income and social opportunities between the regions, social strata, nationalities and age groups decrease. Poverty diminishes. Education (in a broader sense) contributes to the decline of cultural polarisation in society by the introduction of support programmes for disadvantaged groups (e.g. the elderly and the poor). Despite this fact, the decrease in cultural polarisation is delayed as it is a longer-term process than the one to reduce the differences in income.

evening up

Regional tensions decrease significantly. Nevertheless, the economic advantage enjoyed by the capital, Budapest and the northern Trans-Danubian counties still appears feasible. A rapid development is seen in the northern Hungarian regions and regions of the southern Trans-Danubian region. The development process regarding the advancement of infrastructure also contributes to lessening the differences. The variances in the development between settlements are influenced and shaped by their access opportunities to information networks.

The role of civil society strengthens and is not restricted to filling the niches left by the retreating welfare state. In accordance with the principle of subsidiarity, civil organisations become an active factor and player in political life.

civil organisations

Civil organisations play an important role in re-establishing cohesion in a society which had become individualised and had fragmented into different interest groups during the 1990s. This also regenerates social solidarity and trust. The civil sphere is an appropriate training ground to acquire and develop the abilities of tolerance, communication, conflict-solving, cooperation and joint decision-making, thereby also educating and training the future generations of policy-makers and politicians. Civil society and trust also plays an important role in countering the negative trends in health indicators and improving the economic performance of the country.

value system

A shift towards non-material values is apparent in the value system of most social groups due primarily to the radical drop in the number of people living in material insecurity and struggling for a living.

Another important factor is the common understanding that the continued destruction of the environment and communities exerts an unbearable burden on the population, primarily in urban settlements. A small part of the population with poor living conditions continues to be driven by material wealth and consumption. However a shift

[15] The eco-tax reform substantially decreases the burden on labour while increasing taxes on products, manufacturing processes and capital revenues producing heavy environmental burdens.

of values takes place in social groups with living conditions of a medium level which represent the backbone of society, enhancing the importance of the environment and community life.

environment

The state of the natural environment improves considerably due to the shift in the economy towards technologies exerting a lower ecological burden. The life-span of products becomes longer and re-cycling becomes a general requirement resulting in a significant drop in the volume of waste and an improvement in energy efficiency. The impact of the eco-tax reform lowers the use of non-renewable natural resources and increases the proportion of renewable ones. The latter primarily comprises the role of wind and solar energy, biomass and geothermal energy resources which play a significant role.

The environmental industry simultaneously becomes a strong sector of the economy. This is initially manifested in the commercialisation of Hungarian R&D results for the Central and Eastern European markets.

Environmental pollution arising from transport decreases due to a more balanced development level amongst the regions and the creation of new jobs in rural areas close to residential settlements. The increased role of mass transportation has similar effects. Further to membership in the EU membership, new highways are constructed and the transportation infrastructure sees rapid development. The environmental burden caused by transport does not increase. The damage to health arising from environmental pollution also decreases as a combined result of the above improvements. The external costs of damage to health caused by environmental pollution is not met by central financial resources but is paid for by the companies responsible for the pollution based on the *polluter pays principle*.

The environmental qualification of companies becomes extensive and the environmentally friendly operation of companies becomes common in industry, agriculture and in the service sector.

Along with laws which are transparent and enforced effectively, more importance is afforded to regulations which strengthen market interests and mechanisms.

economy

The growth rate of the GDP slows down in the long-term in line with EU trends. By that time domestic income will have grown considerably and the differences in income in comparison with the more developed countries will have lessened.

Indirect state involvement in the maintenance of welfare services and the financing of healthcare, education, R&D and infrastructure development sees an increase in real terms but the percentage actually decreases as the private sector and, to a lesser extent, civil organisations also participate in the advancement of these areas.

The domestic business sector joins the world economy on a competitive basis on the basis of the development of high knowledge-intensity industries. There may be no potential for the country to achieve leading roles in technology in many areas but this situation may be arise in some special cases. Nevertheless the adoption of technology development becomes the general pattern in the innovation processes and this primarily

applies to enterprises that are able to join international strategic alliances possessing the most advanced technologies and organisational techniques. At the same time, the country also takes advantage of the opportunities arising from the intensified Central and Eastern European cooperation.

Today's rigid organisations disintegrate. There is a change in the way in which companies are managed due to the new methods and structures demanded by the so-called virtual companies of the future which rely on the complex knowledge base of final product makers, component suppliers and customers (according to the current differentiation). As a partial consequence of this, the relatively clear boundaries that exist today between the service and other sectors become more indistinct. Companies with different activities (in today's terms: manufacturers and service providers) join closely cooperating networks.

networks

The so-called knowledge-intensive business service providers play a dominant role in the networks. They produce a significant number of innovations and generate considerable demand for new products and methods developed elsewhere. They therefore stimulate the creation of innovative ideas and also contribute to a rapid and wide-ranging dissemination of innovation results.

'Garden-Hungary'

In agriculture, production shifts to more knowledge and labour-intensive activities, namely to vegetable and fruit cultivation, bio-production and seed-grain production. However the significance of wheat, meat and milk production also remains. There is an extensive development of certain biotechnological products and applications which do not endanger human health and the environment and respect ethical requirements.

Organic and environmentally friendly methods gain in importance. With regard to activities that go beyond production, the role of landscape preservation and landscape planning services increases. A vertical and horizontal harmonisation of competitive garden-farms takes place both at local and global levels and a new system of production and marketing cooperatives is established. A large number of farmers upgrade their knowledge on a continuous basis by using reference consulting services and other means and forums.

infrastructure

In the field of investments in infrastructure, progressively more importance is given to facilities necessary to access and exchange information. Telecommunications, broadcasting, information technology and consumer electronics technologies converge. Access to the Internet becomes a basic condition of everyday life. The development of the global information infrastructure has an effect on all areas of social activities, ranging from commerce through to healthcare, education, public administration and leisure activities.

The domestic transport system becomes an integral part of the European one. An improved harmonisation of urban development and transport planning leads to a substantial decrease in the differences in regional development. Private capital plays a greater role in investments in the transport system with regard to both operation and

maintenance. The principle of '*let the user pay*', which enjoys broad social consensus, becomes extensive and increasingly widespread.

energy sector

The domestic energy systems gradually close the gap on and finally catch up with the Western European environmental protection norms. The generation, transformation and use of energy occurs at the lowest possible level of harmful emissions.

Hungary is connected to the large, united international energy systems and the security of energy supply therefore reaches that of Western Europe. The favourable changes in technologies and regulations lead to a significant improvement in the efficiency of energy utilisation and we are also able to exploit the traditionally excellent Hungarian knowledge in this area. Customers increasingly demand quality as they expect high quality energy services in order to improve their general standard of living.

The political changes and the socio-economic developments are mutually reinforcing trends. The role of the state changes as it participates in the capacity of stimulator, opening new gateways to civil initiatives. Simultaneously, the attitude of the people changes. Instead of waiting for the state to provide what is required, the people are self-reliant and organise themselves in order to assert their interests, also in the political sphere. In accordance with EU practice, highly qualified and well-paid officials work in public administration.

Representative democracy is gradually changed through the direct participation of the people in the field of policy-making. The principles of decentralisation and self-governance prevail at both national and local level. The continuous dialogue on social tensions and the values to be pursued in the resolution process, the methods to be applied and the resources available is the most important source and also consequence of the strengthened social solidarity.

Drifting (Scenario 2)

SUMMARY OF THE SCENARIO

Under this scenario Hungary also integrates into the global economic and social structure and joins international organisations, including the European Union. However, due to the absence of an active government strategy, this integration proceeds on the basis of reaffirming Hungary's present semi-peripheral position and, even in the best case, it develops along the path of a medium level of knowledge-intensity.

drifting and a widening gap

This scenario does not allow us to effectively realise the opportunities provided by the international organisations, particularly those offered by the European Union. The gap between Hungary and the developed countries is not diminished. Moreover the application of more complex indicators than per capita GDP to measure the level of social advancement reveals an increasingly widening gap on an international level and a significant polarisation of society.

CURRENT TRENDS

This scenario actually describes the continuation of the present political, economic and social trends. Therefore this vision of the future primarily extrapolates the currently prevailing trends in the country. The factors which point to such a vision of the future include a state which is further withdrawing from financing the welfare services, a weak civil sphere, participants left to the mercy of external conditions and unable to seize new opportunities, increasing social and ethnic tensions, unfavourable demographic trends and a growing social polarisation.

EXTERNAL CONDITIONS

The realisation of this scenario may be a result of both external and internal factors. The most important external factor seems to be the considerable postponement of the accession to the EU. In this case the advantages arising from EU membership, namely more rapid economic development and technological and organisational modernisation, will only occur in the more distant future.

The scenario's underlying principle is that there will be no significant setbacks in foreign policy and the economic relations of the country. No serious tensions will occur in the relationships with neighbouring countries, the Balkan states will stabilise slowly, the political and economic situation in Russia will consolidate and no radical political groups will emerge that would seriously endanger international security. Economic globalisation will continue, no large-scale crises will occur although regional conflicts may continue to recur. It is also assumed that no major shifts will take place in the Hungarian political scene, the institutional system of democracy will not be seriously endangered and social peace will be preserved.

THE PROCESS

The key element in this scenario is the lack or low level of active government strategy. The role of the state weakens in all areas. State support for the welfare services is cut back, the government's actions are mainly limited to 'putting out the fires' and they give way to the pressures of economic interest groups. Social and environmental regulations become looser, their implementation is stalled and corruption and crime increases.

a passive state

The role of local government is controversial. It is also be affected by the crisis of the state but significant differences occur between the municipalities as more is able to be done to meet the needs of the people in the more well-off regions.

a weak civil society

Civil society is unable to strengthen to the extent that would enable it to compensate for the absence of government actions and counterbalance the lack of comprehensive development programmes.

The adverse conditions for the advancement of the civil sphere are exacerbated by the weak and inadequately developed traditions of Hungarian civil society, the lack of

government support for civil organisations and the fact that a fully-fledged 'middle-class' had not yet emerged.

Company managers become the most active and influential players in the ongoing trends, although the initiatives are primarily put forward and decided upon by multinational companies and international economic organisations. Indigenous companies (especially small- and medium-sized companies) are unable to protect their interests efficiently due to their position of dependency.

CHARACTERISTICS OF THE SCENARIO

The level of education increases within the population in line with the demands of the employment market and development of technology and people continue to train and re-train. Nevertheless increasing differences in the level of education emerge. One-third of society is unable to enter secondary or higher education or specialised professional training and significant differences between the educational institutions become apparent.

education

An increasing number of schools and universities emerge which are based on market principles, providing a high-quality but largely very expensive education. However most of the state-financed institutions offer services of deteriorating quality, diminishing the values of the degrees obtained therein. Those who can afford it study abroad but foreign students rarely come to Hungary to study. Several elementary schools, comprehensive secondary schools and higher education institutions close as a result of this and also due to the decreasing number of new students entering the education system.

The research undertaken by domestic R&D institutions consists primarily of adaptation and measuring services necessary to preserve the Hungarian market positions of international companies. Researchers in Hungary do not take part in international education and research programmes, talented middle-aged researchers look for work abroad and the younger generation choose careers other than research or start their research career by applying for foreign jobs. Only those who are truly obsessed pursue a research career in Hungary, keeping a handful of research units in operation. The dissemination of R&D results and the processes of innovation and dissemination are shaped by the interests of foreign-owned companies. The innovation processes may speed up on occasion in certain areas but in general they develop much more slowly and involve far fewer companies in Hungary than in the developed countries.

health

Life expectancy increases slowly but still falls short of the level in the developed countries at the end of the given time-period. Social inequalities (polarisation) are also significant. Life expectancy approaches the level of the Western European indicators amongst the population living in the relatively more developed Western regions and cities of the country and those enjoying an above-average income level. However life expectancy stagnates in the less developed regions and amongst the lowest income groups. Circulatory diseases and malignant tumours as causes of death decrease slowly but are replaced by infectious diseases in the population groups with the lowest income

levels. Tuberculosis and other diseases believed to have been overcome re-emerge with more virulent strains of bacteria and viruses. Allergies become widespread and symptoms of severe anguish and depression also increase. The spread of disease may be attributed to social and environmental conditions, the deteriorating environmental quality, characteristics of the way of life, diminishing social cohesion and the sense of vulnerability resulting from social differences and the intensification of human conflicts in society.

social differences

Social differences increase and are not offset by adequate government policies. Increasing differences in income and other aspects (e.g. culture) become evident between the regions, social strata, ethnic groups and age groups.

In the capital, Budapest, and in the north-western region of the country the per capita income increases to a level which is five times higher than that in the poorest regions of eastern Hungary. (At the moment the difference is 'only' 3-4 times higher). The population of the cities in the Trans-Danubian region grows slowly and there is continuing migration from the villages. By 2020 some areas of the Great Hungarian Plain will have become depopulated. The gap between the highest and lowest-income groups widens and the income of the wealthiest decile of the population grows to eight times higher than that of the poorest decile (it is currently 6.5 times higher). A higher share of total income (30%) goes to the top decile (compared to 25% at present). The middle class splits into two groups, with a smaller number enjoying relatively high living standards while the majority are in danger of falling into poverty.

10-15 per cent of society, those who are internationally competitive and enjoy a correspondingly high level of income, succeed in joining the global networks. On the other hand, one-third of society is made up of people who are seriously struggling and who have next to no chance of improving their depressed living conditions.

future vision and values

Initially the people's perception of their future will probably improve but pessimism will soon set in. The major problems include a sense of insecurity, dependence at the workplace, the lack of a conceivable future and crime. The importance of individual values grows and there is an increasing number of people who are unable to name a single thing for which they would consider making significant efforts or considerable sacrifices. Despite the escalating problems this individualisation is probably the reason for the continuation of social peace although the popularity of political parties representing extreme ideologies increases.

environment

The environmental situation deteriorates following an improvement in the 1990s. Environmental aspects lose their importance due to the lack of adequate regulations or their low level of enforcement. Clean technologies grow primarily in export-oriented industries that are exposed to European environmental requirements and market competition (e.g. the machinery industry). The majority of the companies operating mainly in domestic markets (e.g. smaller companies in the food sector) operate technologies with a high pollution-emission rate.

New technologies are introduced with a significant delay in these sectors. The environmental protection structures (sewerage system, modernisation of power plants etc.) and the clean-up of polluted sites also proceeds slowly due to the lack of capital. The environmental situation consequently deteriorates and environmental protection is dominated by subsequent low-efficiency measures and actions. There is no general decline in the total volume of health-damaging environmental pollutants and the likelihood of a slight increase even exists.

The situation in the built environment reflects the polarisation of society. The financial resources required to restore sites of cultural heritage and develop the urban environment are available in the relatively more developed regions and cities however the relatively poor settlements see a general deterioration in the built environment. The suburbs of Budapest and Western Hungary are characterised by a dense pattern of settlements, housing estates, shopping centres, industrial buildings, warehouses, roads and lorry parks. Some of the cities in the eastern part of the country (e.g. Nyiregyháza and Szeged) start to grow. Although they become regional centres for the regions which overlap the national borders, the danger of 'slumming' emerges as many people with poor living conditions migrate to the cities in the hope of getting jobs.

economy

Per capita GDP increases slowly throughout the whole period of the scenario but it fails to reach the level of the developed countries and its distribution becomes progressively more unbalanced. With regard to income and revenues, the rate of both personal wages and state revenues decrease since the multinational companies take an increasing proportion of their revenues from the country.

Revenues from personal income taxes and corporation taxes fall and the tax revenues from the consumption sector are eroded by the growing black economy. A decreasing trend is apparent in the state support for welfare services, healthcare, education, research and infrastructure development. In the years following the EU accession the current account deficit and that of the central budget experience a sharp increase. The subsequent stabilisation programme leads to a cut-back in welfare services. An increasing proportion of state expenditure is spent on encouraging and supporting the investments of multinational companies and the development of their infrastructure.

The ageing of the population and the increasing unemployment leads to the growth of the dependency ratio within society. The number of jobs does not increase and in fact decreases after 2010 with long-term unemployment remaining at around 12-15 per cent. Amongst the active workforce, more and more people become entrepreneurs especially in the service sector. The number of employed persons falls continuously with the increase of productivity. Fluctuation intensifies and the period of employment spent at a workplace becomes increasingly shorter. The domestic social and labour regulations erode and the dependence of employees increases in line with international trends.

wheat-meat production chain

The significance of agriculture in the domestic economy continues to decrease. The role of industry grows for a short period of time but declines at a later stage. The role of the services sector, however, strengthens slowly throughout the period covered by the study. Agriculture is characterised by the dominance of the wheat-meat production chain, the labour-intensive cultivation cultures are not widespread, no harmonised structural changes take place and the professional consulting services operate exclusively on a market basis. The growth of exports is slow and problems of a cyclical nature continue to reappear. The structure of the industrial sector changes to a certain extent. The textile, mining and metallurgy industries diminish while production in the food and chemical industries show a slight increase. The machinery industry remains significant both with regard to production and exporting.

high-tech enclaves

The technologies applied in the industrial sector lags behind the leading ones. Waste-free and material/energy-saving technologies are only used sporadically. The dominant form of foreign investments are high-tech enclaves that use advanced technologies and produce top quality goods while employing low–qualified indigenous labour, thus conducting activities of low knowledge-intensity. The average level of technology of the economy is far behind that of the developed countries. There are only a relatively few number of local, small and medium-sized component suppliers operating as ‘satellites’ of multinational companies and their impact on economic growth and job creation remains insignificant. The technological level of the small and medium-sized enterprises varies considerably. Some keep up with the development in technology but many try to economise on their increasing capital costs by purchasing and using inexpensive second-level energy and labour-intensive technologies.

infrastructure development

The development of the telecommunications and transport infrastructure is also be unbalanced and marked by a significant polarisation. The infrastructure continues to develop with new roads and telecommunications networks being built in the more wealthy Western regions of the country. Computers with Internet connections are available in every school as well as in most homes. The eastern regions of the country see a stagnation in the development of the infrastructure. The motorways to the borders of the country may be completed but they primarily serve transit traffic. Pure economic aspects dominate both the decisions and actions with regard to the development of road construction and the telecommunications network. The objective is to develop backbone networks connecting the most important economic centres.

The development of infrastructure networks in the eastern regions is uneven due to the lack of economic interest. The state is only able to complete the motorway construction and maintain the main railway network. The quantitative and qualitative level of mass transportation decline, passengers’ waiting times increase due to traffic jams leading to regulations limiting the use of public roads by individual drivers. The forms of combined transport are unprofitable, the supply and quality of services are poor and there are no efficient inter-connections in the system.

energy sector

Due to the lack of a targeted strategy to serve the interests of the Hungarian population and economy, the interests of foreign-owned companies also determine the development of the energy supply system. The state, employing relatively poorly-qualified and poorly-paid officials who are also politically vulnerable, is unable efficiently to monitor, control and regulate the activities of companies that operate simultaneously in several areas of the energy sector.

Cross-financing therefore becomes widespread in the sector due to the liberalised pricing system. The weak state continues to be unable to prepare the state-owned energy companies for international competition. The level of indigenous knowledge in the sector increases slowly and is only used to the extent and in forms that are in the interests of the multinational corporations. Accession to the EU results in the energy supply becoming more secure and environmental regulations more severe.

education, healthcare and social infrastructure

The infrastructures relating to education, healthcare and social aspects are characterised by significant differences in quality. Due to the emergence of private educational institutions and hospitals providing high quality (but expensive) services, the deterioration of the state services becomes even more apparent.

State expenditure on education shows a decreasing tendency in real terms. Expenditure on healthcare only rises slowly and does not meet the growing needs. The rare charitable foundations are not able to compensate for the deficiencies in the state-maintained institutions. The non-profit sector is underdeveloped and there are no efficient civil organisations due to both lack of resources and the low level of political and community activity of the people. The institutional network of direct democracy and civil movements are weaker than desired.

Alternative development (Scenario 3)

SUMMARY OF THE SCENARIO

The emergence of a new way of thinking and new values in the world is the basic assumption of this scenario. Initiatives opposing the present form of globalisation will become stronger and finally take over enabling the development of a new form of socially and ecologically sustainable globalisation based on cooperation. The most important characteristics of the desired course of development envisioned in our scenario may be described as follows: modest, appropriate, harmless, small-scale and prudent.

The Hungarian civil society and government prepare themselves in advance for the above fundamental changes. They steer the country towards a course of advancement that will lead to an entirely new state of development within 40-50 years, a development based on high-quality education, new skills and cultural standards and a widespread use of advanced technologies.

CURRENT TRENDS AND THE SEEDS OF NEW VALUES

The realisation of this scenario appears unlikely in view of most of the current trends. Nevertheless efforts to implement such a scenario are already emerging in the form of

global civil organisations. Consequently the thoughts underlying this scenario are being addressed in documents and at meetings of influential international organisations. This vision of the future is based on two underlying principles: national consensus emerges in Hungary in respect of the need for a 180-degree turnaround in the major ongoing trends, and this new way of thinking prevails on a global basis The present seeds of alternative development take root and the world embarks on a new course of development. The European Union, in accordance with the principle of subsidiarity, attaches great importance to preserving cultural and environmental diversity against the interests of market-based mobility. The extensive efforts by both civil society and the government sector aim to lay the foundation for a new model of integration in the long-term which supports and encourages bioregional integration, namely regional integration organised along ecological units.

The government chooses civil society as its primary social partner in the implementation process as opposed to business groups interested in preserving the status quo. Central measures are primarily and increasingly limited to maintaining and protecting the socio-economic frameworks.

new casting

According to the principle of subsidiarity, civil society takes over an increasing share of tasks from the state and finally becomes the major force in both economic and political governance (civil economy and direct democracy). The business sector has no other choice but to cooperate in its own profound transformation.

The scenario is based on the assumption that the focus of Hungary and the world will shift from the current practice, characterised by an irreversible destruction of the life tissues of the communities and the environment, towards a strategy of creative social and economic development. This would enable us to avoid the social and environmental damages and catastrophes arising from the currently prevailing trends of forced modernisation, bureaucratisation and individualisation.

EXTERNAL CONDITIONS

The scenario assumes that external (international) conditions are also necessary to realise the above course of development. With regard to international relations, this scenario envisions the European Union moving forward along the above lines, counterbalancing the disadvantages of the American-type capitalism and limiting its negative impact on European culture. The principle of subsidiarity is even now prevalent in the European Union and its application in everyday practice fully concords with the scenario described here.

the European Union

The traditionally strong civil organisations of the EU (especially certain influential environmental organisations) openly sympathise with these efforts constituting an appropriate political counterbalance against scepticism, hostility and opposing interests within the Union. Some economic sectors of the European Union, particularly the high-

tech environmental industries, have a direct economic interest in our choice of path of development.

neighbours

We presume that, by 2005, Hungary, the Czech Republic, Poland and Slovenia will have joined the European Union within the first enlargement round which is supported by the positive attitudes described in the scenario. The Romanian and Slovakian governments continue to improve relations with us. Hungary supports the accession of these countries to the European Union and contributes in every way possible to their choice of the desired (restrained and creative) alternative course of advancement.

The reinforcement of bioregional cooperation, namely the active support of regional cooperation based on ecological principles, has a special importance within these achievements. Ukraine embarks on the path of slow but long-term development made possible and strengthened by the domestic political processes developing in the country. We also presume that the situation in Yugoslavia will consolidate. The European Union becomes a cooperative partner in this process as the revitalisation of the Balkans is in its economic interests. New opportunities emerge for Hungary to improve ecological cooperation in the border regions.

The external economic conditions of the scenario and their interrelation with the Hungarian economy are quite complex. Favourable conditions exist to support the shift to a new course of development and the formation of a new type of international cooperation as the international community has set a firm and rapid course of development in the same direction.

‘*green economy*’

As a result of the changes taking place in the world several companies, primarily the European ones, are ready to reorganise their operations in accordance with local interests (with the introduction of the so-called stakeholders’ approach in their organisational structure in the short-term.)

The openness of the country towards exports and imports remains unchanged but the structure of international trade and cooperation is different due to the profound changes occurring in the world. A rapid shift takes place in the structure of the country’s trade links towards an environmentally friendly approach and these products and services are a predominant part of the slightly decreasing volume of trade.

structural changes

Hungary remains a good market for the well-developed environmental industries of the European Union and Hungarian ‘green’ inventions, especially organic agricultural products, account for an increasing market segment of the environmentally sensitive consumers of the EU. Economic relations and units based on bioregions with neighbouring countries see a slow but decisive development which is supported by the Hungarian government by every possible means.

The state’s foreign debt continues to decrease and will have in fact been eliminated by 2015 as a result of debt-for-nature swap actions. This favourable trend is supported by the transformation of the international financial system in accordance with the global ‘alternative development’.

THE PROCESS

The Hungarian government implements a carefully devised and very creative strategy for the development of the economy and society in close conjunction and with the active contribution of the majority of society. The changes in the institutional system are achieved fairly rapidly due to concerted government activity. Environmental protection and nature conservation are an integral part of the comprehensive strategy of the government, providing both adequate regulations and guarantees of their enforcement. Great changes are seen in the regulations (sanctions and incentives) providing frameworks for the economy. The tax burden on labour drops sharply as a result of the eco-tax reform with a concomitant drastic increase in taxes on technologies, products and capital revenues with high ecological burdens. As the present material and energy-intensive technologies and processes that pollute the environment become non-profitable (or are even banned), a large number of companies are unable to adapt to the new conditions and go bankrupt or cease operations in Hungary.

new institutions and new technologies

A radical shift in technologies takes place. An increase is seen in technologies and processes that are waste-free and constitute a lesser ecological burden and more renewable energy resources and recyclable materials emerge. Economic advantages are enjoyed by smaller-scale and labour-intensive processes and technologies which are gentler on the environment (for example mini power plants). Their expansion absorbs employees laid off by liquidated companies. This process is supplemented and reinforced by the creation of a large number of new jobs caused mainly by the needs of local communities in labour-intensive areas of the social services.

A particular focus is placed on strengthening and decentralising the enforcement of law and order in the short and medium term. The problems of the abuse of regulations and the extent of ‘freeloading’ attitudes decrease in society as the social, political and economic changes proceed. Governance becomes progressively more decentralised and democratic. This process is aided by the more widespread application of the principle of subsidiarity supported by a well-developed institutional system of direct (discursive and participative) democracy.

local needs and local communities

Bold and far-reaching government actions are required to shape the civil economy. Central government actually has to agree to its own dismantlement while gradually transferring its tasks to the civil sphere which organises itself. Economic activities are managed and controlled by organisations which meet the needs of local communities. With regard to ownership structures, an increasing proportion of local/community ownership forms emerge. Small and medium-sized enterprises and their networks, which show dynamic development, become the engines of the economy.

Computer and information networks enable regular and efficient communication between different communities, organisations and individuals.

R&D and innovation

The revitalisation of R&D plays a key role in the development of a knowledge-intensive economy. The reinforcement of the R&D sector is a government priority. Research consequently becomes an attractive career, the level of training for researchers becomes higher and the network of small research enterprises expands on a rapid basis.

The revival of the education system is a natural pre-requisite for the advancement of the above economic changes. This system should produce creative and resourceful people who are educated in many disciplines as well as being socially and environmentally committed. Changing values become the key to this process as the development of intellectual, spiritual and moral potential play a crucial role in the above structural and institutional shifts.

education and training

The need for and the reputation of non-material goods become widespread as the population becomes better informed and customer awareness increases. A better public education leads to an improvement in public knowledge about nutrition and physiology. The need for a healthy diet and a healthy way of life increases and the level of education plays a key role in the dissemination of the means and methods of preventing individual illnesses. The knowledge and skills of healthcare professionals is enhanced by the introduction of complementary medicine into education and this also contributes to the advancement of a health culture amongst the population. The emergence of new lifestyles reduces the need for mobility and enhances the value of knowledge about and commitment to local cultural and natural assets and communication with others.

CHARACTERISTICS OF THE SCENARIO

These new conditions lead to the development of favourable demographic trends by 2050. The attitudes of the younger generation towards having families and raising children change in a favourable direction. The proportion of multi-generation families increases along with the growth in the role of the family. The ageing tendency in society turns around and the age distribution of the population improves gradually. The physical and mental state of the population also improves as a result of the changes in the way of life and the better level of educational. This is complemented by the favourable physical and mental impact of the ecologically aware and performance-based economy.

demographic trends

The life expectancy of both the male and female population increases, reaching a level of 80 years in both cases. The active life cycle resulting from the better health conditions improves which will have a beneficial effect on the ratio of the active workforce and dependants. The stronger local and social cohesion and the much improved conditions for equal opportunities in careers cause a considerable increase in the morbidity and mortality statistics.

level of education

The level of education of the Hungarian population will have reached that of the European forefront by 2050. The skills and abilities with regard to cooperation and

creativity play a dominant role in this achievement. The education period extends and learning in fact becomes a lifelong activity.

An increase is evident in career mobility in terms of the number of job and profession changes during the period of employment. In this context the stigma also starts to disappear as changing jobs becomes increasingly widely accepted with the favourable change in social attitudes and the need for more flexibility in education.

social differences

The development of civil society and the economy bring about radical changes with regard to social aspects. Polarisation decreases drastically and the dividing lines between the different social groups vanish in every respect (between generations, sexes, types of settlement, and ethnic groups). Temporary positive discrimination measures lead to improved equal opportunities for cumulatively disadvantaged ethnic groups (e.g. gypsies).

The horizontal and balanced development of bioregions becomes a priority for the state. Improved trust and solidarity within society also contribute to the advancement of this process and by 2050 the needy and the 'losers' (regions and social groups alike) will catch up with those that had more fortunate starting conditions.

environment

The state of environment shows significant improvement in every respect. One of the most important changes is contained in the increased area of nature preservation with the ratio rising to 33 per cent of the total against the present 8 per cent. One-third of the country's territory belongs to the highest category of nature conservation and environmental protection and the so-called ecological corridors provide guarantees for their preservation. Environmental protection becomes a key 'generator' of the innovation process by inducing considerable demand for technologies regarding environmentally friendly manufacturing and pollution clean-up. Mobility decreases due to the changes in values and lifestyles.

economy

A re-evaluation of economic factors (e.g. success and wellbeing) takes place. Since economic growth as measured against GDP would provide inadequate feedback to the policy-makers, this indicator is rejected and a new, multi-dimensional system of development indicators applied.

Information technology achievements are built into materials and widely used in manufacturing processes. Certain biological methods appear in the new materials industry. An emerging development of creative cooperation between the reviving traditional (labour-intensive) production methods and high-tech industries becomes apparent in the economy in the long term. The government and civil organisations have the final decision on the kind of production methods or products to achieve social legitimacy and therefore a 'green light' to the market.

organic agriculture

Hungarian agriculture, with state coordination, is rapidly restructured and experiences a shift in values. Forms of organic farming with optimum adaptability to ecological

conditions increase along with high labour-intensity and less mechanised cultures and farming methods. The emergence of socio-economic organisations based on bioregions also contributes to the increase in eco-production. The advancement of this process is also facilitated by improved environmental awareness and commitment to local community values together with the favourable conditions of Hungary in this area.

The government administration prioritises knowledge and labour-intensive agricultural activities (e.g. horticulture, seed-grain production and organic farming) by applying and enforcing water management and nature conservation regulations. The number of employed persons in agriculture increases in the long term. The population-retaining ability of rural regions and small settlements is restored as a result of the fast and concerted restructuring of the agriculture industry. The size of cities does not increase in the short and medium term and they actually lose population in the long term. The differences in the level of development between the regions diminish rapidly and these have a favourable and evenly distributed population level.

transport

The transport system of the country is primarily connected to the international system through transit roads and the development based on bioregions restructures the transportation requirements. The need for mobility shows a general decrease while the demand for telecommunications services increases on a rapid basis. Information technology becomes more widespread in households and the economy alike. The application of information and telecommunications technologies has a beneficial effect on the achievement of optimum changes. A significant structural change becomes evident amongst the different types of transport. By 2020 the high-speed railways will have been enjoying a dominant market share (with transit transport entirely concentrated in this area) and vehicles using non-renewable energy resources gradually lose their importance.

built environment

Simultaneously, urban planning and development experience profound changes. The cities again belong to pedestrians with particular care paid to children, the elderly and the physically disabled. Inner cities are revitalised and there is no separation of residential and business areas.

Consequently there is an increase in public security and a decrease in the requirement for mobility. Public areas of the cities again become meeting places for citizens and as a result of the revitalisation of city parks we see the return of some of the fauna which previously inhabited the area. Community life becomes more diverse and nature-friendly. This new ‘sense and perception of time’, the general slow-down of the pace of life, is aided by an active central government policy and the increased role of decision-making at community level. This process leads to the disappearance of gaps in the possession of power between laymen and experts.

energy sector

The decreasing environmental burden becomes central to the development of the energy sector and its public perception. The share of renewable energy resources in energy supply increase bringing about an increase in energy prices unless breakthroughs in technology occur.

An increase in the price sensitivity of consumers becomes apparent in terms of the increased inclination towards saving. This leads to a decrease in demand for energy. New conditions stimulate domestic knowledge generation in the energy sector causing the international position of Hungarian R&D in the field to be strengthened. A stronger knowledge base is widely used to protect the environment and reduce energy costs.

Conclusions and recommendations

Hungary has successfully passed the first, very intensive phase of transition and has paid high social costs. The foundations of the new system have been laid and the institutional structure has been established.

at a crossroads

Our present dilemmas may be described by the following, slightly simplified question: what role do we want to play in the globalising, knowledge-driven world economy?

Our freedom of choice is by no means unlimited as our decisions and actions are always determined by certain conditions and the aspirations of our partners. It is primarily our responsibility to create and formulate the conditions which are favourable to us as we cannot expect our partners or the market mechanisms to do this for us. We have to devise and implement a well-founded and concerted government strategy to make it easier for us to gradually catch up with the developed countries and regions of the world. Our present decisions (or the lack of them) may significantly influence the development opportunities of the next 15-20 years. Competitiveness will increasingly depend on the generation and application of knowledge in terms of the quality of education and training, R&D, and the ability to recover, adapt and learn on a ongoing basis. There have been several examples of periphery countries managing to catch up in the past few decades alone.

Recommendation 1

Hungary should embark on a path of development that ensures that the long-term pace of advance exceeds that of the medium developed countries of the European Union on a continuous basis, particularly in the highly knowledge-intensive sectors and the area of healthcare. A development which is socially, economically and environmentally sustainable should be central to our system of values along with the quality of life, the generation of knowledge and the activities required to accomplish these. At the same time, the social costs of closing the gap should not be unfeasibly high as the catching-up process should not lead to acute imbalances and tensions between different social groups and geographical regions of the country.

TEP has not formulated a comprehensive social, political and economic programme for the catching-up process as this is in the remit of the policy-makers. The recommendations are intended to contribute to the removal of certain, major obstacles to development and the emergence of new opportunities for the future. The scope of the recommendations is limited by necessity. Some fundamental issues were raised frequently during TEP's professional debates, such as the problems of disadvantaged social groups, the responsibilities and roles of the government administration,

companies, the media, civil organisations, families and individuals in solving society's problems, public safety, corruption and moral quality. However, these problems are far beyond the remit of the survey set by TEP for the programme and accordingly the recommendations do not address those issues. We would, nevertheless, like to mention that the above areas constitute key factors in the successful implementation of a catching-up programme.

The recommendations are intended to accelerate advancement in three areas by defining both the desirable future state of society and the first steps to achieve it:

- an educated, healthy and learning population;
- a clean environment;
- a well-functioning national system of innovation.

The complete system of TEP's conclusions and proposals are contained in the combination of the panel reports, their recommendations and the report by the Steering Group.

An educated, healthy and learning population

EDUCATION, TRAINING AND LIFELONG LEARNING

The most important and pressing task is to devise and implement a human resources development programme based on a broad social consensus with a timescale exceeding parliamentary election cycles. The snapshots, scenarios and recommendations by the '**Human resources**' panel of TEP may contribute to laying the foundation of such a programme. The snapshots have clearly established that a general shift in paradigms is taking place in the world. The information society provides fundamentally new opportunities but also demands new abilities and skills from everyone. It is highly likely that significant changes will take place in the global labour market in the decades to come. The development of human resources will be unable to keep up with these changes on the basis of the current low reaction time of the traditional education system leading to a probable and considerable training deficit. The countries which are able to sufficiently re-mould their education and training systems will be the winners in this process.

Recommendation 2

The skills, values and knowledge that are being increasingly recognised by the global labour market and with the abilities necessary for lifelong learning should be strengthened at all levels of education. The following skills are of special importance:

- *the ability to learn;*
- *creativity and the recognition, definition and resolution of problems;*
- *the ability to filter huge masses of information and to access and utilise the necessary information;*
- *communication skills and abilities (proper use of the mother tongue and one /two/ foreign language/s/, application of up-to-date telecommunication tools etc.);*

- *the ability to cooperate, work in teams and work in a multi-cultural environment on multi-disciplinary problems.*

The social recognition of teachers should be increased significantly in order to avoid the existing selection of other careers which will lead to even more serious problems, inter alia, the shortage of labour even today.

Recommendation 3

The performance of the national education system should be assessed on a regular basis in order that catching up process is achieved. The financial resources for education should be significantly increased.

Recommendation 4

An indicator system should be established which measures the quality and efficiency of education and training on an objective basis and a monitoring network of organisations capable of implementing this should also be set up.

Recommendation 5

During the next decade it is essential that the total expenditure on education, as a ratio of GDP, should exceed the OECD average on a permanent basis.[16] In order to achieve this, we should strive to reach the top third of the OECD countries in terms of expenditure on education within the next five years and should maintain this position in the long term.

The increase of information and communication technologies is causing rapid and profound changes in almost all social and economic areas. Concrete measures should be taken immediately to meet the challenges and harness the opportunities.

Recommendation 6

In order to facilitate the advancement of the information society, a comprehensive government programme should be formulated for the development of human resources. The most important goals and tasks of the programme are as follows:

- *information technology (IT) 'literacy' should be improved in wide areas of the population, particularly amongst the economically active generations;*
- *to counterbalance the presently low IT capabilities in households, opportunities to access modern info-communication tools should be provided free of charge to as many people as possible in traditional and new public institutions (e.g. schools, libraries, museums and tele-houses);*
- *in the current transition period it is particularly important to provide basic education and training in IT for those generations who have already completed their education. Training of employees in the area of public administration also warrants a good deal of attention. In this area the*

[16] The OECD average was 6 per cent in the middle of the 1990s, which exceeded the same Hungarian indicator by half a per cent but this difference has since increased further.

education and training of teachers is of utmost importance;

- *the introduction of subjects and new methodologies based on interactive and IT tools into curricula should be encouraged, primarily in elementary and secondary schools. To this end the research institutes of education methodology should be built up and their participation in international networks supported;*
- *we should be prepared to upgrade the IT infrastructure of schools on a regular basis involving substantial and continuous increases in budgetary expenditure;*
- *in order to take advantage of potential business and employment opportunities, secondary vocational training should be improved in close cooperation with employers and in many cases through joint publicly and privately financed programmes. New, specialised education programmes should also be introduced in higher education.*

New education and training programmes for lifelong learning should be launched and introduced on a wide basis. The different components of the school system (primarily those of vocational training and higher education institutions) should be encouraged to launch new adult training programmes and special training courses. Government programmes providing state support for citizens who attend training and retraining courses at their own expense have been launched in several developed countries. Such support schemes reduce public expenditure on the unemployment that would occur if these programmes were not launched. The citizens taking part in the training course may also realise their return on personal investment in a shorter time period. One of the solutions would be the introduction of the so-called '**education vouchers**' that provide an add-on state support for every Hungarian citizen who makes a financial contribution to his/her own training.

Recommendation 7

The government is advised to study the feasibility of introducing 'education vouchers'.

In the knowledge-driven economy, the role of knowledge creators increase along with importance of continuous training and the transfer and combination of knowledge and skills acquired in different jobs. A sabbatical year is a traditional form of advanced training for educators and researchers. This would have two advantages for professionals working in companies: a) they may refresh their knowledge every 5-7 years and b) they may transfer their knowledge to their research colleagues in higher education, both to graduates and Ph.D. students. The number and frequency of such scholarships will depend, inter alia, on the availability of state and company resources, the identification of useful tasks and the flexibility of the recipient institutions. It is therefore advisable to introduce the sabbatical programme gradually, starting and refining it in a few institutions and then expanding its range to a national level.

Recommendation 8

The sabbatical system should be introduced for researchers working in higher education and public research institutes, providing the opportunity for a one-year scholarship in every 5-7 years. New state incentives should be introduced to facilitate the creation of similar opportunities for company researchers.

HEALTHY POPULATION

The state has a key role to create appropriate conditions for the preservation of health in addition to the responsibility of individuals and families. This must not only be limited to the treatment of illness.

Recommendation 9

*The government is strongly advised to expand the '**Programme for a Healthy Hungary**'. The time-scale of the programme should be 20-25 years, thus far exceeding the normal parliamentary cycle. It should also span several sectors, not concentrating exclusively on the healthcare system, be preventative in its approach and non-medicinal in its essence by removing medical treatment from the central focus of healthcare. The programme should concentrate on well-defined and clearly measurable goals such as solving the most serious public health problems and reducing the major causes of death.*

The main characteristics of the '**Programme for a Healthy Hungary**' are the following[17]:

- The programme should be based on prevention.
- The efforts must be concentrated on the most critical public health problems: circulatory diseases among the middle-aged male population, mortality due to malignant tumours, nutrition and lifestyle. Smoking, alcohol and drug abuse should be reduced and the proportion of people doing regular physical exercise should be increased in order to achieve an improvement in the above areas.
- An appropriate public health model should be applied. It would be advisable to introduce the so-called ***planned market system*** in Hungary, where the state plays a key role and primarily non-profit making organisations compete with each other on the market.
- Health preservation opens up new business opportunities for many enterprises and market players. It is important to facilitate this process by EU and WTO-conform government measures as the new products and services that emerge are exportable (primarily to Central and Eastern Europe).

A clean environment

A clean environment and the preservation of nature are special values in themselves. In addition they play an increasing role in improving the population's health whilst also becoming key factors of competitiveness. The importance of ecological aspects will increase considerably in most areas of life in the next few years, therefore quite within TEP's timescale. Most of the market players in Hungary are not yet prepared for these changes although a large part of their products and services may become unmarketable as an increasing portion of consumers become more environmentally sensitive. The expected changes in consumption patterns pose a serious threat to inflexible companies whilst bearing new market opportunities for the flexible and innovative ones.

[17] For details see the report by the „Health and life sciences" panel of TEP.

Recommendation 10

The growing proportion of environmentally friendly products, services, methods and technologies in the national market should be considered a key aspect of economic policy-making. To this end the legal situation, the economic conditions and the information process should all be made stronger to encourage cleaner production.

It is anticipated that economical and ecological aspects will become more influential in the regulatory system of the European Union. With regard to this process the following factors should be given special attention:

- the introduction of an environmentally sensitive tax system;
- significant changes in the support system of energy supply, agriculture production and transport, favouring environmental protection;
- the abolishment of support schemes encouraging the use of non-renewable natural resources (i.e. raw materials and certain energy sources);

Recommendation 11

Hungary should pursue a pro-active policy in adopting international environmental regulations. This policy should be based on a continuous monitoring and assessment of international trends.

The teaching of environmentally aware behaviour and the improvement of environmentally sensitive thinking is still receiving less than satisfactory attention in the country. However aspects of environmental protection should become central to the values of the population and it is therefore essential to achieve positive changes in the way of thinking and the behaviour of people.

Recommendation 12

To raise environmental awareness we should:

- *establish environmental centres to formulate complex environmental protection programmes and develop environmental education and training;*
- *raise the level of environmental awareness in teacher training courses and accordingly strengthen the curricula of the relevant educational institutions. With regard to educational programmes providing for specialisation in natural sciences and/or technical fields, the qualification to teach these subjects should involve a high level of environmental knowledge;*
- *launch programmes that encourage the public to be sensitive to the environment, and promote material and energy saving activities;*
- *strengthen the communication and cooperation between the private sector, the government administration and civil society. The government has a leading role here.*

Development of the national system of innovation

The national system of innovation, which had not even been strong in the past, collapsed in the last decade and was followed by a spontaneous reorganisation. It is currently characterised by a general weakness, poor communication and cooperation

between the components of the system and by a low level of knowledge and technology dissemination. One of the most important tasks of economic policy in the next decade will be to establish an efficient national system of innovation.

Recommendation 13

The advancement of the national system of innovation must be considered an integral part of the process to close the development gap and develop a knowledge-driven economy and society. It should be seen as an essential pre-requisite in both government policies and company strategies.

COOPERATION BETWEEN THE PARTICIPANTS IN THE INNOVATION SYSTEM AND THE EXPLOITATION OF KNOWLEDGE

The most important components of the national system of innovation are the institutions which generate and transfer knowledge, company and non-profit making R&D units, professional and scientific organisations and associations, libraries and information centres, innovation consultancy firms in information, market, legal and financial services, science/technology parks and incubators, and regional and national innovation institutions or bodies which make and implement policies. Similarly important factors are the complex inter-relationship and cooperation between the different participants in the system and their links to the economy and society. Another important part is played by the general norms and rules of social conduct that fundamentally determine the above relations, the means of economic policy (i.e. incentives and support/funding schemes) and traditions. The innovation system may be considered efficient in the country if it facilitates the social and economic exploitation of knowledge generated anywhere in the world.

Recommendation 14

Measures aimed at developing the national system of innovation in the future should be taken and implemented. The following priorities should be considered:

- *there should be increased cooperation and more mobility between the research/education area and the business sector. Special attention should be paid to this aspect when devising government support/funding schemes for research and scholarship programmes;*
- *the adaptability of Hungarian higher education should be accelerated and in this regard the links between the research institutes of higher education and the Hungarian Academy of Sciences (HAS) should be strengthened along with the cooperation between the universities and business entities. It should be common practice in five years for higher education to carry out a knowledge transfer function in addition to its research (knowledge generation) and education (knowledge transmission) functions. The commercialisation of knowledge generated in the higher education institutions and the research institutes of the HAS should be encouraged. In this regard special attention should be paid to the establishment of small, technology and knowledge-intensive enterprises and the affiliation with the research networks of international corporations based on strategic partnerships;*

- *Particular importance should be attached to the development of transfer institutions, primarily information centres, industrial competence centres, organisations and research units based on the cooperation between the government, universities and industry, as well as technology incubators.*

RECOMMENDATIONS RELATED TO FUNDING POLICY

Recommendation 15

It is highly recommended that top priority be given to the following objectives in the future in order that the state R&D budget may be used more effectively:

- *company R&D expenditure should be increased at a rate which considerably exceeds the average. To this end we advise spending the majority of the future increase in public R&D expenditure to the facilitation of this process;*
- *the rapid development of the domestic R&D infrastructure is essential, involving both private resources and investments. A high priority should be given to improving the quality of R&D equipment and the info-communication infrastructure and to reaching the level of developed European countries.*

Recommendation 16

The Government should submit a comprehensive report to the parliament in 2001 detailing the indirect market incentives of domestic innovation and comparing conditions with those of OECD countries. The report should also include a medium-term development strategy and a schedule of legislative actions concerning this issue.

Recommendation 17

In 2001, the Government should assess the impacts of the venture capital law of 1998 and take appropriate measures to effectively encourage Hungarian capital market investments into innovation.

Recommendation 18

A cautious state procurement policy should also be introduced to raise demand for technology-intensive products and services. The most important areas are education, healthcare, public administration and national defence.

PRIORY SUBJECTS FOR R&D

Findings of the TEP Steering Group, panel meetings and the debates involving a large number of experts have confirmed that it would not be wise at this juncture to set long-term priorities for subjects within science and technology. The pace of advancement is accelerating therefore the choice of any field as a priority would constitute a great risk, especially for a small, medium-developed country.

Recommendation 19

When setting long-term research priorities we have to prevent the interests of single scientific fields from dominating the process. The efficient operation of the national

system of innovation requires knowledge generation and transfer in a wide range of scientific fields based on the cultivation of all the fundamental scientific disciplines. Contemporary scientific research lays the foundation for tomorrow's applications (technologies), rather than today's.

We must make concerted efforts in certain areas to develop our innovation potential. This must be based on international trends and must take account of the present domestic conditions, primarily those in the field of human resources. The measures must therefore not only be limited to the R&D base, they should encourage the processes that will lead to a better social and economic exploitation of knowledge, increase the range of products and services with a high added value and have a more direct impact on competitiveness.

Recommendation 20

In the medium term, in the light of international trends and national strengths, particular importance should be given to significantly increasing support for and improving performance in the following two areas of technology:

- *life sciences (including biotechnology);*
- *information and communication technology.*

SOUND INNOVATION POLICY DECISIONS

The government administration is one of the key players of the national system of innovation which influences social and economic processes by making policies and regulatory decisions. Developing this mechanism is one of the critical elements of our catching-up process. In a time of accelerated global technological changes, one of the most important requirements is that the public administration should be receptive towards new global trends. Ongoing systems of monitoring and regular assessment of the changes are the pre-requisites for effective operation and active decision-making. We can afford no delays in making adequate policy measures (correcting old and setting new strategies) based on fact and a proper understanding of the actual trends. This attitude and approach will have a much greater importance in the next 15-20 years than ever before.

Recommendation 21

The current vertical decision and policy-making structures within the Government should be changed in order to meet the challenges which are becoming increasingly horizontal in nature.

The policies regarding innovation, education and training, industry, competitiveness, investment, regional development, employment and the measures taken in the fields of monetary and fiscal policy will all have a considerable influence on the innovation capabilities of the economy and society. The formulation, introduction and implementation of the aforementioned policies should be coordinated in a more efficient manner in the future than they are today.

Recommendation 22

To improve policy-making and strengthen strategic decision-making in the area of innovation, the Government should introduce the methodology and tools that are widely applied internationally in the field of innovation and should establish an adequate institutional network for their application and utilisation. To this end, the following government measures should be taken:

- *an investigation, in conjunction with the parliament, into the conditions for establishing a technology assessment institution in this country.*
- *the establishment of a science and technology observatory to monitor the national R&D and technology innovation base in accordance with OECD standards and methodology.* [18]
- *the establishment of an evaluation system for national higher education and R&D programmes that will regularly evaluate the performance of different institutions and the efficiency of the use of public money in accordance with international norms and involving international experts with high reputations.*

[18] The operation of the centre as a government institution is advised with strong legal guarantees of professional independence which meet international norms and standards.

Future tasks

The assessment phase of TEP will be accomplished by publishing the report of the Steering Group and the panel reports. It will be followed by the dissemination of results and the implementation of the recommendations. Internationally, assessments of this kind are carried out at five-year intervals with the interim period being devoted to the dissemination and utilisation of the findings. It is advised that the dissemination of results should be continued through to the end of 2002. The focus should be on this activity in 2001-2002, possibly complemented by a few, new assessment exercises (e.g. filling out shortened and simplified Delphi questionnaires at professional meetings, testing macro-visions with Delphi questionnaires tailored specifically to the task and organising virtual expert forums via the Internet.) Based on international experience, we propose the establishment of so-called 'shadow' working groups as early as 2001, comprised of graduate and Ph.D. students. These should monitor the implementation of TEP recommendations and bring a new breed of thinking into the next phases of TEP. The use of up-to-date IT tools, primarily interactive homepages, is of the utmost importance in the dissemination and 'testing' of the results.

It would be useful to launch regional technology foresight programmes based on the results of TEP. Such activities should generally be financed from regional resources as the lack of local means would indicate a low commitment to the programmes on the part of the regional participants and therefore a low expectation of the findings being implemented. At the same time, however, it would also be desirable to support the regional programmes from central resources, based on a competitive application process. (Support is available even today through certain EU schemes for the formulation of regional innovation development strategies and will probably be more widespread in the future). TEP can provide assistance to the regional foresight programmes with regard to methodology including the transfer of directly applicable international experiences.

Hungarian firms and business groups along with as industrial or professional associations may also launch their own technology foresight programmes in line with international examples. International organisations (i.e. EU, UNIDO) are also planning to launch a Central and Eastern European foresight programme that would cover several countries in the region. Since Hungary is the only country in the region which has so far completed a technology foresight programme, we should provide significant support for such an exercise both in terms of methodology and human resources.

It would be useful to assess the achievements of the first Hungarian technology foresight programme in 2002-2003 and commence the second TEP to evaluate the changes that will have occurred by then in the fields of science and technology and within the economy and society. As part of the preparation for the second TEP, the methods used in the first exercise and the process as a whole should be evaluated in conjunction with foreign experts.

References